Tight sets on the Hermitian variety $H(2r+1, q^2)$

(Talk)

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(joint work with Leo Storme (Ghent University))

A set $\mathcal{T}$ of points of a finite polar space $\mathcal{P}$ of rank $r \geq 2$ over a finite field of order q is i-tight if for any $P \in \mathcal{P}$

$$|P^{\perp} \cap \mathcal{T}| = \begin{cases} i\frac{q^{r-1}-1}{q-1} + q^{r-1} & , P \in \mathcal{T} \\ i\frac{q^{r-1}-1}{q-1} & , P \notin \mathcal{T}. \end{cases}$$

It has been shown in [1] that an i-tight set on the Hermitian variety $H(2r+1, q^2)$, $q^2 > 16$, is a union of pairwise disjoint Baer subgeometries $PG(2r+1, q)$ and generators $PG(r, q^2)$, when $i < q^{10/8}/\sqrt{2} + 1$. Combining the generalized version of known proving techniques [2], with recent results on blocking sets and minihypers, we have been able to give an alternative proof of this result and consequently improve the upper bound on i. We shed a new light on an "old" technique and show how it can be used to obtain new results.

References

[1] J. De Beule, P. Govaerts, A. Hallez, L. Storme, *Tight sets, weighted m-covers, weighted m-ovoids, and minihypers*, Des. Codes Cryptogr. **50**, 187-201, (2009).

[2] K. Metsch, L. Storme, *Partial t-spreads in PG(2t+1,q)*, Des. Codes Cryptogr. **18** , no. 1-3, 199-216, (1999).

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