Small point sets of PG(n, q^3) intersecting each k-subspace in 1 mod q points

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SEMINAR INCIDENCE GEOMETRY
27 November 2009

A point set B of PG(n, q) is called a *small minimal* $(n-k)$*-blocking set,* if B intersects every k-dimensional subspace, $|B| < 3(q^{n-k}+1)/2$ and no proper subset of B meets all the k-spaces of PG(n, q). All known small minimal $(n-k)$-blocking sets are from a class of blocking sets called *linear blocking sets*. The Linearity Conjecture states that all small minimal $(n-k)$-blocking sets of PG(n, q) are linear blocking sets. In a joint work with Klaus Metsch, Tamás Szőnyi and Zsuzsa Weiner we proved the linearity of small minimal $(n-k)$-blocking sets which meet every k-space of PG(n, q) in 1 modulo $\sqrt[3]{q}$ points, if q is a third power. As a consequence, we get that small minimal $(n-k)$-blocking sets of PG(n, p^3), $p \geq 7$ prime are always linear. In this talk I will present the main steps of our proof.

References

[1] N. V. Harrach, K. Metsch, T. Szőnyi, and Zs. Weiner. Small point sets of PG(n, p^{3h}) intersecting each line in 1 mod p^h points. Submitted to *J. Geom.*

[2] N. V. Harrach, K. Metsch. Small point sets of PG(n, q^3) intersecting each k-subspace in 1 mod q points. Submitted to *Des. Codes Cryptogr.*