Resolving sets for higher dimensional projective spaces

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Let $R(n,q)$ be a resolving set for the point-hyperplane incidence graph of $\mathrm{PG}(n,q)$. In this talk estimates on the size of $R(n,q)$ are presented. We prove that if q is large enough then

$$|R(n,q)| \geq 2nq - 2\frac{n^{n-1}}{(n-2)!}.$$

This generalizes tha planar result of *Héger* and *Takáts* [2] stating that the metric dimension of the point-line incidence graph of a projective plane of order q is $4q - 4$.

Translating the result of *Fancsali* and *Sziklai* [1] about higgledy-piggledy lines to the language of resolving sets, we get that if $q = p^r$, $p > n$ and $q \geq 2n - 1$ then $|R(n,q)| \leq (4n - 2)q$. We improve their result and show that $|R(3,q)| \leq 8q$ and $|R(4,q)| \leq 12q$. In the cases $p < n$ and $q < 2n - 1$ we prove that $|R(n,q)| \leq (n^2 + n - 6)q$.

Joint work with *Daniele Bartoli, Stefano Marcugini* and *Fernanda Pambianco*.

References

[1] FANCSALI, SZ. AND SZIKLAI, P., Lines in higgledy-piggledy arrangements, *Electron. J. Combin.*, 21 (2014) no. 2, Paper 2.56, 15 pp.

[2] HÉGER, T. AND TAKÁTS, M., Resolving sets and semi-resolving sets in finite projective planes, *Electron. J. Combin.*, 19 (2012) no. 4, Paper 30, 21 pp.