Perp-systems, an overview

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A perp-system $\mathcal{R}(r)$ is a maximal set of r-dimensional subspaces of $\mathrm{PG}(N,q)$ equipped with a polarity ρ, such that the tangent space of an element of $\mathcal{R}(r)$ does not intersect any element of $\mathcal{R}(r)$. Perp-systems are introduced in the paper [2]. At the end of that paper a perp system consisting of 21 lines in $\mathrm{PG}(5,3)$ is given, which is a computer result by Rudy Mathon. Recently a more geometric construction of this system has been given in [1].

In this talk we will give an overview of the results from both papers and we will also treat some open questions.

References

[1] John Bamberg and Frank De Clerck. A geometric construction of Mathon's perp-system from four lines of $\mathsf{PG}(5,3)$. Submitted to Journal of Combinatorial Designs, 2009.

[2] Frank De Clerck, Mario Delanote, Nicholas Hamilton, and Rudolf Mathon. Perp-systems and partial geometries. *Adv. Geom.*, 2(1):1–12, 2002.