On characterization of the Grassmann graphs $J_2(2d+2,d)$

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This is joint work with Jack Koolen

The Grassmann graph $J_q(n,d)$, $n \geq 2d$, is a graph (of diameter d) defined on the set of d-dimensional subspaces of an n-dimensional vector space over the finite field $\mathbb{F}_q$, with two subspaces being adjacent if their intersection has dimension $d-1$.

In 1995, Metsch [1] showed that a distance-regular graph with the same intersection array as $J_q(n,d)$ is indeed $J_q(n,d)$ unless $n=2d$, $n=2d+1$, ($n=2d+2$ if $q \in \{2,3\}$), or ($n=2d+3$ if $q=2$).

In 2005, Van Dam and Koolen [2] constructed the twisted Grassmann graphs, a family of distance-regular graphs with the same intersection array as $J_q(2d+1,d)$, but not isomorphic to them, for all prime powers q and $d \geq 2$.

In 2015, the authors showed that the Grassmann graph $J_2(2d,d)$ can be characterized by its intersection array, if the diameter d is an odd number or large enough.

In this talk, we will discuss a characterization of the Grassmann graphs $J_2(2d+2,d)$.

References

[1] K. Metsch, A characterization of Grassmann graphs. *European J. Combin.* **16** (1995) 171–195.

[2] E. R. van Dam, J. H. Koolen, A new family of distance-regular graphs with unbounded diameter. *Invent. Math.* **162** (2005) 189–193.