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On Linear Codes Whose Weights and Length Have a Common Divisor

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Certain problems in coding theory translate naturally into problems concerning point sets in projective or affine space with special intersection properties with respect to certain subspaces. As an example, consider a set of p^2 points in $AG(3,p)$ which intersects every plane in 0 mod p points. Must this set necessarily be the union of p parallel lines? In the talk a very much related problem will be considered, and its relations to the objects mentioned in the title will be explained. The main object will be to show how to use a certain kind of polynomial to attack these problem. This polynomial first appeared in a proof of an upper bound of the number of nuclei of a point set, then it played a crucial role in the non existence proof of maximal arcs in planes of odd order. These results will be mentioned and it will be indicated what the relevence of the polynomial is. (Joint work with Simeon Ball, András Gács, Péter Sziklai, and Zsuzsa Weiner.)