

UNIVERSITY OF DELAWARE  
DEPARTMENT OF MATHEMATICAL SCIENCES  
DISCRETE MATHEMATICS SEMINAR

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# *m*-Systems of Polar Spaces: Applications to Semipartial Geometries, Codes, and Graphs

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Let  $\mathcal{P}$  be a finite classical polar space of rank  $r \geq 2$ . A *partial  $m$ -system* of  $\mathcal{P}$  is a set of  $m$ -dimensional subspaces  $\mathcal{M} = \{\pi_1, \pi_2, \dots, \pi_k\}$  of  $\mathcal{P}$  such that every generator of  $\mathcal{P}$  containing an element  $\pi_i \in \mathcal{M}$ , is disjoint from all elements  $\pi_j \in \mathcal{M}$ ,  $i \neq j$ . If the size  $k$  of  $\mathcal{M}$  is equal to the size of an ovoid of  $\mathcal{P}$ , then  $\mathcal{M}$  is said to be an  *$m$ -system* of  $\mathcal{P}$ . In fact,  $m$ -systems generalize both ovoids and spreads of finite classical polar spaces.

One reason for studying  $m$ -systems of finite classical polar spaces is the fact that they can be used to construct other interesting objects. This talk is concerned with explaining how some of the basic geometric properties of  $m$ -systems lead to the construction of semipartial geometries, strongly regular graphs and 2-weight codes.