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The VC-dimension and point configurations over finite fields

We will discuss connections between Erdős type problems in vector spaces over finite fields and the notion of Vapnik-Chervonenkis dimension. In particular, for a sufficiently large subset $E \subseteq \mathbb{F}_q^2$, we study the VC-dimension of $\mathcal{H} := \{(S-x) \cap E : x \in E\}$, where $S := \{(x_1, x_2) \in \mathbb{F}_q^2 : x_1^2 + x_2^2 = t\}$ for a fixed $t \in \mathbb{F}_q$. We generalize this result to other curves besides the circle, and also present a version for planes in \mathbb{F}_q^3 .