# On BEL configurations and finite semifields

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In this talk we will explain the *Knuth orbit* of a semifield $\mathbb{S}$: a set of six isotopism classes of semifields associated to $\mathbb{S}$ (from [2]), and discuss ways of extending it, using techniques from finite geometry. A *BEL-configuration* in $\mathbb{F}_q^{rn}$ is a triple $(\mathcal{D}, U, W)$, where $\mathcal{D}$ is a Desarguesian spread, and $U$ and $W$ are subspaces of dimension $n$ and $rn - n$, resp., such that no element of $\mathcal{D}$ intesects both $U$ and $W$ nontrivially. The concept was introduced in [1], and generalized to linear sets in [3]. It was shown that such a configuration can be used to construct a semifield of order $q^n$, with center containing $\mathbb{F}_q$. It was also shown that every semifield can be constructed in this way. A BEL-configuration for $r = 2$ allows a new operation on semifields, known as *switching*, from which a single BEL-configuration gives up to two Knuth orbits of semifields. In collaboration with John Sheekey we obtained a new operation which extends this, generating up to four Knuth orbits from a single BEL-configuration.

## References


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