Symmetric polynomials over finite fields

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Abstract: Consider the action of the symmetric group S_n on the n-dimensional vector space over the finite field $\mathbb{F}_q$ of q elements, where q stands for a prime power p^k. We have an induced action on $\mathbb{F}_q[x_1, \ldots, x_n]$ the coordinate ring of $\mathbb{F}_q^n$. Kemper, Lopatin and Reimers proved that the elementary symmetric polynomials of degree $2k$ form a separating set of minimal size in the invariant ring over the $2-$element finite field. Based on their paper we have managed to exploit this result: over an arbitrary finite field $\mathbb{F}_q$ the set of elementary symmetric polynomials of degree jp^k (with $j \in \{0, \ldots, q-1\}$, $k \in \mathbb{Z}_{>0}$ and jp^k smaller or equal to n) form a separating set. Moreover, this separating set is not far from being minimal when $q = p$ and the dimension is large compared to p. In the talk I will present the main ideas and the outline of the proof.