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Multiplicity Distribution of Quartic Polynomials over Finite Fields

In a 2020 paper by Li and Pott, the intersection distribution was introduced as an invariant of projectively equivalent $(q+1)$-subsets of the finite projective plane $PG(2,q)$, and can be equivalently characterized via polynomials over $\mathbb{F}_q$. The multiplicity distribution was later introduced as a refinement. In this talk, we discuss previous work done to calculate the intersection and multiplicity distribution of polynomials over $\mathbb{F}_q$, as well as new results for the multiplicity distribution of arbitrary degree 4 polynomials over finite fields of characteristic 2 and 3.