Permutation Polynomials and Translation Planes

Ulrich Dempwolff, FB Mathematik, Universität Kaiserslautern

Let F be a finite field. We consider permutation polynomials $P \in F[x]$ of the form $P(X) = L(X)X^k$, $0 < k < |F| - 1$, where L is an additive polynomial, i.e. $L(x + y) = L(x) + L(y)$. There is a simple connection between such polynomials and translation planes of order $|F|$ which admit a cyclic group of order $|F| - 1$ such that this group has orbits of length 1, 1, and $|F| - 1$ on the line at infinity. We discuss some classes of such permutation polynomials in characteristic 2. This includes polynomials connected with exceptional polynomials, i.e. polynomials which are permutation polynomials in infinitely many fields. (This is joint work with Peter Müller).