# Index and Carlitz Rank of Permutation Polynomials

Leyla Işık

Salzburg University

( Joint work with A. Winterhof )

Index and Carlitz rank are two important measures for the complexity of a permutation polynomial $f(x)$ over the finite field $\mathbb{F}_q$. In particular, for cryptographic applications we need both, a high Carlitz rank and a high index. In this article we study the relationship between Carlitz rank $Crk(f)$ and index $Ind(f)$. More precisely, if the permutation polynomial is neither close to a polynomial of the form $ax$ nor a rational function of the form $ax^{-1}$, then we show that $Crk(f) > q - \max\{3Ind(f), (3q)^{1/2}\}$. Moreover we show that the permutation polynomial which represents the discrete logarithm guarantees both a large index and a large Carlitz rank.