Transversal Intersection for further results on the conjecture of exceptional APN functions.

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For $L = GF(2^n)$, a function $f : L \to L$, is said to be *exceptional almost perfect nonlinear* (EAPN) on L if it is APN infinitely often, this means for all $a, b \in L$, $a \neq 0$, the equation $f(x + a) - f(x) = b$ have at most 2 solutions on L, and on infinitely many extensions of L. Aubry, McGuire and Rodier conjectured in 2009 that the only exceptional APN functions are the well known Gold and Kasami monomial functions, $f(x) = x^{2^k+1}$, $f(x) = x^{2^k-2^k+1}$ respectively. Several partial results have been obtained for several authors including us, which essentially consist on proving that families of algebraic surfaces are absolutely irreducible. In this talk we provide particular families of absolutely irreducible surfaces defined over finite fields of characteristic two. We show that some components of these surfaces intersect transversally, implying the absolute irreducibility of them. This fact permited us recently to make progress in the proof on this conjecture in its hardest case, the Kasami-Welch case.

Keywords:APN functions, exceptional APN functions, Gold functions, Kasami-Welch functions, absolutely irreducible polynomials, transversal intersections.

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