

## ABSTRACTS FROM PAPERS AND PREPRINTS

- *Normal subgroups of the algebraic fundamental group of affine curves in positive characteristic*, preprint submitted for publication, joint work with P. Zalesski and K. F. Stevenson

Let  $\pi_1(C)$  be the algebraic fundamental group of a smooth connected affine curve, defined over an algebraically closed field of characteristic  $p > 0$  of countable cardinality. Let  $N$  be a normal (resp. characteristic) subgroup of  $\pi_1(C)$ . Under the hypothesis that the quotient  $\pi_1(C)/N$  admits an infinitely generated Sylow  $p$ -subgroup, we prove that  $N$  is indeed isomorphic to a normal (resp. characteristic) subgroup of a free profinite group of countable cardinality. As a consequence, every proper open subgroup of  $N$  is a free profinite group of countable cardinality.

- *Le problème de Lehmer abélien pour un module de Drinfel'd*, accepted for publication in the International Journal of Number Theory, joint work with S. David

Let  $\phi$  be a DRINFEL'D module defined over a finite extension  $K$  of  $\mathbb{F}_q(T)$ ; we establish a uniform lower bound for the canonical height of a point of  $\phi$ , rational over the maximal abelian extension of  $K$ , and thus solve the so called abelian version of the Lehmer problem in this situation. The classical original problem (a non torsion point in  $\mathbb{G}_m(\mathbb{Q}^{\text{ab}})$ ) was solved by F. AMOROSO and R. DVORNICICH.

- *Selmer groups of abelian varieties in extensions of function fields*, accepted for publication in Mathematische Zeitschrift

Let  $k$  be a field of characteristic  $q$ ,  $\mathcal{C}$  a smooth geometrically connected curve defined over  $k$  with function field  $K := k(\mathcal{C})$ . Let  $A/K$  be a non constant abelian variety defined over  $K$  of dimension  $d$ . We assume that  $q = 0$  or  $> 2d + 1$ . Let  $p \neq q$  be a prime number and  $\mathcal{C}' \rightarrow \mathcal{C}$  a finite geometrically GALOIS and étale cover defined over  $k$  with function field  $K' := k(\mathcal{C}')$ . Let  $(\tau', B')$  be the  $K'/k$ -trace of  $A/K$ . We give an upper bound for the  $\mathbb{Z}_p$ -corank of the SELMER group  $\text{Sel}_p(A \times_K K')$ , defined in terms of the  $p$ -descent map. As a consequence, we get an upper bound for the  $\mathbb{Z}$ -rank of the LANG-NÉRON group  $A(K')/\tau'B'(k)$ . In the case of a geometric tower of curves whose GALOIS group is isomorphic to  $\mathbb{Z}_p$ , we give sufficient conditions for the LANG-NÉRON group of  $A$  to be uniformly bounded along the tower.

- *On the rank of abelian varieties over function fields*, Manuscripta Math. **118**, 361-381 (2005)

Let  $C$  be a smooth projective curve defined over a number field  $k$ ,  $A/k(C)$  an abelian variety and  $(t, B)$  the  $k(C)/k$ -trace of  $A$ . We estimate how the rank of  $A(k(C))/tB(k)$  varies when we take a finite geometrically abelian cover  $p : C' \rightarrow C$  defined over  $k$ .

- *Fibrations et conjecture de Tate*, Journal of Number Theory **112** (2005) 345 - 368, joint work with M. Hindry, R. Wazir

We describe the behaviour of the rank of the Mordell-Weil group of the Picard variety of the generic fibre of a fibration in terms of local contributions given by averaging traces of Frobenius acting on the fibres. The results give a reinterpretation of Tate's conjecture (for divisors) and generalises previous results of Nagao, Rosen-Silverman and the authors.

- *Sur le rang des Jacobiennes sur un corps de fonction*, Bulletin de la Société Mathématiques de France, joint work with M. Hindry **133** (2005), 275-295

Let  $f : X \rightarrow C$  be a projective surface fibered over a curve and defined over a number field  $k$ . We give an interpretation of the rank of the Mordell-Weil group over  $k(C)$  of the jacobian of the generic fibre (modulo the constant part) in terms of average of the traces of Frobenius on the fibers of  $f$ . The results also give a reinterpretation of the Tate conjecture for the surface  $X$  and generalizes results of Nagao, Rosen-Silverman and Wazir.

- *Distributions of the traces of Frobenius on elliptic curves over function fields*, Acta Arithmetica **106.3** (2003), 255-263

Given an elliptic curve  $E$  defined over the function field  $K$  of a smooth projective connected curve  $C$  defined over a finite field  $\mathbb{F}_q$  of characteristic greater than 3, we estimate the number of points of  $C$  whose fiber is smooth, of bounded degree and with a prescribed trace of Frobenius in terms of quadratic class numbers and the degree of the associated  $j$ -map. In the particular case of universal elliptic curves over Igusa curves, the bound is attained.

- *Finite quotients of the algebraic fundamental group of projective curves in positive characteristic*, Pacific Journal of Mathematics **192** (2000), 143-158, joint work with Katherine F. Stevenson

Let  $X$  be a smooth connected projective curve defined over an algebraically closed field  $k$  of characteristic  $p > 0$ . Let  $G$  be a finite group whose order is divisible by  $p$ . Suppose that  $G$  has a normal  $p$ -Sylow subgroup. We give a necessary and sufficient condition for  $G$  to be a quotient of the algebraic fundamental group  $\pi_1(X)$  of  $X$ .

- *Integral points on elliptic curves over function fields of positive characteristic*, Bulletin of the Australian Mathematical Society **58** (1998), 353-357

Let  $K$  be a one variable function field of genus  $g$  defined over an algebraically closed field  $k$  of characteristic  $p > 0$ . Let  $E/K$  be a non-constant elliptic curve. Let  $M_K$  be the set of places of  $K$  and let  $S \subset M_K$  be a nonempty subset. Mason and Voloch proved that the number of  $S$ -integral points of a Weierstrass equation of  $E/K$  defined over  $R_S$  is finite. However, no explicit bound for this number was given. In this note, under the extra hypothesis that  $E/K$  is semi-stable and  $p > 3$ , we obtain an explicit upper bound for this number for a certain class of Weierstrass equations called  $S$ -minimal.

- *The equation  $y^n = f(x)$  over function fields of positive characteristic*, Acta Mathematica Hungarica **81** (1998), 89-94

In this note we obtain an explicit upper bound for number of solutions of the equation  $Y^n = F(X)$  over a function field of characteristic  $p > 0$ . We assume that the equation is not  $p^{m+1}$ -degenerate for some integer  $m \geq 1$ .

- *Rational points on Igusa curves and  $L$ -functions of symmetric representations*, Journal of Number Theory **58** (1996), 343-360

The purpose of this paper is to give a new and explicit proof of a result due to Ulmer in which he computes the  $L$ -functions of symmetric representations of the first étale cohomology group of universal elliptic curves over Igusa curves in terms of Hecke polynomials.

- *Unramified Galois covers of algebraic curves*, Journal of Number Theory **53** (1995), 211-228

Let  $X$  be a complete irreducible nonsingular curve defined over an algebraically closed field  $k$  of characteristic  $p$ . We consider a finite group  $G$  of order prime to  $p$ . In this paper we count the number of unramified Galois coverings of  $X$  whose Galois group is isomorphic to an irreducible  $\mathbb{F}_p[G]$ -module. In this counting we use Rück's definition of the generalized Hasse-Witt invariants, obtaining a generalization of results of Nakajima and Katsurada.

- *The trace of the Cartier operator and character sums*, Communications in Algebra **18** (1990), 3689-3703
- *A note on relations between zeta-functions of Galois coverings of curves over finite fields*, Canadian Mathematical Bulletin **33** (1990), 282-285