Algebraic Geometry & Number Theory Abstracts

1. **Yotam Hendel**:

On uniform dimension growth bounds for rational points on algebraic varieties

Abstract: Given an integral projective variety X defined over Q, the dimension growth conjecture, now a theorem following works of Browning, Heath-Brown and Salberger, asserts that the number of rational points on X of height at most B should not exceed $cB^{\dim X+\epsilon}$, where c is a constant depending on X and ϵ, and assuming that X is not a linear space. A stronger uniform version, which is still open for cubics, requires c to depend only on the degree of X, the dimension of the ambient space, and ϵ.

In this talk I will report on ongoing work, in which we study and generalize uniform dimension growth type bounds in the affine case, using a new effective higher dimensional variant of Hilbert's irreducibility theorem.

Joint work with Raf Cluckers, Pierre Dèbes, Kien Nguyen and Floris Vermeulen.

2. **Dmitry Kerner**:

Artin approximation. The ordinary, the inverse, the left-right and on quivers

Abstract: (Artin) Take a vector of analytic/algebraic power series, F(x,y). Any formal solution y(x) of the system F(x,y)=0 is approximated (by powers of the ideal (x)) by solutions in analytic/algebraic series. Geometrically, suppose a morphism of (analytic/etale) scheme-germs admits a formal section. This formal section is adically approximated by analytic/etale sections.

The inverse question of Grothendieck) Given a map of (analytic/etale) scheme-germs. Suppose its formal stalk is a section of some formal morphism. Is the initial map a section of some (analytic/etale) morphism? The answer is yes in the etale case (Popescu) and no in the analytic case (Gabrielov).

The left-right version of this question is important for the study of morphisms of scheme-germs, and was addressed by M.Shiota in the real-analytic/Nash context. These versions appear to be particular cases of the general "Artin approximation problem on quivers".

I will present characteristic-free results.

3. **Lior Rosenzweig**:

The Chebotarev density theorem for function fields – incomplete intervals.

Abstract: We prove a Polya-Vinogradov type variation of the the Chebotarev density theorem for function fields over finite fields valid for “incomplete intervals”. Applications include density results for irreducible trinomials in Fp[x].

4. **Zev Rosengarten**:
   Rational points on linear algebraic groups

Abstract: In 1984, Oesterlé proved that a wound unipotent group of dimension strictly less than p-1 over a global function field of characteristic p has only finitely many rational points. The bound p-1 is sharp, as one can construct wound unipotent groups of dimension p-1 which are unirational and therefore have Zariski dense set of rational points. Oesterle posed the natural question: Must a wound unipotent group over a global function field which admits infinitely many rational points admit a nontrivial unirational subgroup? One can of course formulate the question for arbitrary linear algebraic groups (though the wound unipotent case turns out to be the crucial one). In this talk I will discuss a proof of the affirmative answer to Oesterlé's question (in this slightly greater generality).

5. **Jiali Mo**:
   The Galois covers of some Zappatic surfaces

Abstract: Embed an algebraic surface X into a n-dimensional complex projective space, and let X(Gal) be the Galois cover of X. Then the fundamental group of the Galois cover is stable in the components of moduli space. In 1998, Teicher gave a programm to determine the structure of the Galois cover of X. In this talk, we try to give some new views about the above program. Here, we will give some theorems for the fundamental groups of the Galois covers of some Zappatic surfaces and we present the results of all our calculations about the Chern numbers and signatures of the Galois covers of the above surfaces.