Fall 2018

- **August 27 (Monday)**
  Speaker: N/A
  Title: Organizational Meeting
  Abstract: We will discuss schedule and speakers for this semester

- **September 18 (Tuesday)**
  Speaker: Vaidehee Thatte (Binghamton)
  Title: Ramification Theory for Degree p extensions of Arbitrary Valuation Rings in Positive Characteristic, part 1
  Abstract: In classical ramification theory, we consider extensions of complete discrete valuation rings with perfect residue fields. We would like to study arbitrary valuation rings with possibly imperfect residue fields and possibly non-discrete valuations of rank ≥ 1, since many interesting complications arise for such rings. In particular, defect may occur (i.e. we can have a non-trivial extension, such that there is no extension of the residue field or the value group) when the characteristic is positive. We will discuss some new results in the equal characteristic case, similar results are true in the mixed characteristic $(0,p)$ case.
  We will begin with a few examples of Artin-Schreier extensions of valuation fields and explicitly compute some invariants of ramification theory in each case. Time permitting, we will also discuss a generalization of the classical Swan conductor.

- **September 25 (Tuesday)**
  Speaker: Alexander Borisov (Binghamton)
  Title: Singular Fano Varietes
  Abstract: One of the Fields Medals this year went to Caucher Birkar for his birational geometry work, that included in particular a proof of so-called Borisov-Alexeev-Borisov conjecture. This conjecture was proposed independently by me and Valery Alexeev around 1993. I will give a short introduction to the subject, to state the BAB conjecture (now Birkar's Theorem) and discuss some related results and open questions.

- **October 2 (Tuesday)**
  Speaker: Alexander Borisov
  Title: A search for Keller maps
  Abstract: I will update on my, so far unsuccessful, search for Keller maps, i.e. counterexamples to the Jacobian Conjecture. In particular, I will present a detailed framework for such counterexample and explain how one can use computers to check if it leads to a Keller map.

- **October 9 (Tuesday)**
  Speaker: Vaidehee Thatte (Binghamton)
  Title: Ramification Theory for Degree p extensions of Arbitrary Valuation Rings in Positive Characteristic, part 2
  Abstract: We will continue discussing Artin-Schreier extensions of valuation fields in positive characteristic. We will present some results that relate the “higher ramification ideal” of the extension with the ideal generated by the inverses of Artin-Schreier generators via the norm map. We will also introduce a generalization and further refinement of Kato's refined Swan conductor for such extensions.

- **October 15 (Monday)**
  Speaker: Viji Thomas (Cleveland State)
  Title: A Report on Schurs Exponent Conjecture and some closure properties of the nonabelian tensor product of groups and the second stable homotopy group of the Eilenberg Maclane Space
  Abstract: The talk has three parts. In the first part, I will describe Schurs Exponent conjecture, and the progress

made so far on this conjecture. Then we will briefly describe the work done by us towards this conjecture. After this we will describe some closure properties of the nonabelian tensor product of groups and finally time permitting, we will discuss the relationship of the nonabelian tensor product with the second stable homotopy group of the Eilenberg-Maclane space.

- **October 23 (Tuesday)**
  Speaker: Vaidehee Thatte (Binghamton)
  Title: Ramification Theory for Degree p extensions of Arbitrary Valuation Rings in Positive Characteristic, part 3
  Abstract: Let K be a valued field of characteristic $p > 0$ with henselian valuation ring A. Let L be a non-trivial Artin-Schreier extension of K with B as the integral closure of A in L. In the classical theory, B is generated as an A-algebra by a single element. This is not true when there is defect. We will discuss a result that allows us to write B as a “filtered union over A”, in such cases.
  We will conclude the series with some remarks on how to obtain analogous results in the mixed characteristic $(0, p)$ case.

- **November 6 (Tuesday)**
  Speaker: Marie Langlois (Cornell)
  Title: Building Variable Homogeneous Integer-valued Polynomials Using Projective Planes
  Abstract: A polynomial f over $\mathbb{Q}[x,y,z]$ is integer-valued if $f(x,y,z)\in \mathbb{Z}$, whenever $x,\ y$ and z are integers. This talk will go over various examples of these and general techniques to find bases for the modules they create. Then, the focus will be on the case of f being homogeneous and how to construct polynomials such that the denominators are divisible by the highest possible power of $p=2$. Projective H-planes will be introduced, which are a generalization of finite projective planes over rings, to construct a correspondence between lines that cover H-planes and homogeneous IVPs that are a product of linear factors. This correspondence will be illustrated starting with the degree 8 case where we produce a polynomial with the largest possible denominator which factors as a product of linear polynomials.

- **November 13 (Tuesday)**
  Speaker: Andrew Obus (Baruch College)
  Title: Explicit resolution of weak wild quotient singularities on arithmetic surfaces
  Abstract: Given a smooth projective curve X over a complete discretely valued field K, it follows from well-known work of Abhyankar/Lipman that there is a regular model of X defined over the valuation ring of K. A particularly interesting case is when X has potentially good reduction. In this case, there is a natural model of X with so-called quotient singularities. Resolution of tame quotient singularities is well understood, and we will give a complete picture of the resolution of the simplest case of wild quotient singularities (which we call ”weak wild arithmetic quotient singularities”). Our techniques involve heavy use of deformation theory and valuation theory, in contrast to the more global techniques that have been used by Lorenzini on related problems.

- **November 19 (Monday)**
  Speaker: Isabel Leal (Courant)
  Title: Generalized Hasse-Herbrand functions
  Abstract: The classical Hasse-Herbrand function is an important object in ramification theory, related to higher ramification groups. In this talk, I will discuss generalizations of the Hasse-Herbrand function and go over some of their properties. These generalized Hasse-Herbrand functions are defined for extensions L/K of complete discrete valuation fields where the residue field k of K is perfect of characteristic p>0 but the residue field l of L is possibly imperfect.

- **November 27 (Tuesday)**

Speaker: Changwei Zhou (Binghamton)
Title: Survey of some recent results in arithemetic surfaces and new observation
Abstract: In this talk I will review analytic torsion and show a proof that it has an upper bound only depending on genus when we give the surface Arakelov metric. To my knowledge this is the first result of this type in the literature. The work is a direct corollary of Jorgenson and Kramer's work on the non-completeness of Arakelov metric on the moduli space. I will also discuss some relevant work by Wilms, Bost, Soule, Wentworth and Faltings.

- **December 4 (Tuesday)**
Speaker: Sayak Sengupta (Binghamton)
Title: An overview of Jacobian Conjecture in positive characteristic
Abstract: This is the first in the 2-talk series. I am going to start with the statement of Jacobian Conjecture along with some related examples. After that I am going to talk about our problem of interest which is an analogue of the Conjecture, establishing its connection and some very interesting examples.