Junior Symposium Program

Schedule

Time	Talk / Event
11:00–12:00	**Simon Kaib** *From Tate Curves to Raynaud Uniformization*
12:00–13:30	*Lunch break*
13:30–14:30	**Nutsa Gegelia** *Arithmetic aspects of Picard–Fuchs equations*
14:30–15:00	*Coffee break*
15:00–16:00	**Nathan Tiggemann** *Combinatorial orientability*
16:00–16:30	*Coffee break*
16:30–17:30	**Miriam Philipp** *Rigid meromorphic cocycles for function fields*
17:30 onwards	*Pizza & drinks*

Abstracts

Simon Kaib (Frankfurt)

From Tate Curves to Raynaud Uniformization

Two tools for understanding abelian varieties with bad reduction are Néron models and the non-Archimedean Raynaud uniformization. I will introduce these classical ideas and sketch some arguments. At the end, I will say a few words about recent joint work on the existence problem of Néron models, as well as uniformization over higher rank valuation rings.

Nutsa Gegelia (Mainz)

Arithmetic aspects of Picard–Fuchs equations

Periods of algebraic varieties satisfy Picard–Fuchs differential equations arising from the Gauss–Manin connection, whose singularities and monodromy reflect the geometry of the underlying families. Using families of elliptic curves as guiding examples, we will explain how Picard–Fuchs equations, together with Frobenius structures and p-adic deformation methods, can be used to extract arithmetic information about individual fibers, such as Frobenius traces and local Euler factors. Finally, we will discuss how local monodromy and the degeneration of families can provide information about the bad Euler factors and conductors of their associated L-functions.

Nathan Tiggemann (Darmstadt)

Combinatorial orientability

In $\mathbb{A}^1$-enumerative geometry, one poses questions in enumerative geometry over an arbitrary field k. One way to tackle enumerative questions is via tropical geometry. It allows counting problems from enumerative geometry to be translated to a tropical counterpart where one can use combinatorial methods to solve the problem. This was successfully generalized to $\mathbb{A}^1$-counts. For the $\mathbb{A}^1$-count to be well-defined, one must choose a relative orientation of the vector bundle.

In this talk, we introduce a new combinatorial version of relative orientability and show that the tropicalization of orientable vector bundles is combinatorially orientable.

Miriam Philipp (Heidelberg)

Rigid meromorphic cocycles for function fields

The classical theory of singular moduli can be used to obtain explicit generators for abelian extensions of imaginary quadratic number fields. In the first part of the talk, I will give a brief overview of this theory and its conjectural real quadratic analogue via the notion of rigid meromorphic cocycles due to Darmon and Vonk. In the second part of the talk, we will have a look at these rigid meromorphic cocycles in the setting of global function fields. A fundamental question concerns the analogy of structural results by Darmon, Vonk, and Gehrmann. I will present such a result that I have shown as part of my PhD project and highlight some challenges of the function field setting.