Timetable

Monday

09:00	-	10:00	Registration + Coffee
10:00	-	10:15	Lorentz introduction + Organizers introduction
10:15	-	11:00	Oleksiy Klurman
11:00	-	11:15	Break
11:15	-	12:00	Shabnam Akhtari
12:00	-	13:30	Lunch
13:30	-	14:15	Joe Silverman
14:15	-	14:30	Break
14:30	-	17:30	Speed talks (with coffee break)
17:30	-	19:00	Welcome reception

Tuesday

09:00	-	09:45	Alina Ostafe
09:45	-	10:15	Coffee break
10:15	-	11:00	Sam Chow
11:00	-	11:15	Break
11:15	-	12:00	Nicole Looper
12:00	-	13:30	Lunch
13:30	-	14:15	Florian Luca
14:15	-	14:30	Break
14:30	-	15:10	James Worrell
15:10	-	18:00	Breakout groups

Wednesday (A Computational Viewpoint)

09:00	-	09:45	Alin Bostan
09:45	-	10:15	Coffee break
10:15	-	11:00	Joël Ouaknine
11:00	-	11:15	Break
11:15	-	12:00	Sander Dahmen
12:00	-	13:30	Lunch
13:30	-	15:30	Breakout groups
15:30	-	16:00	Coffee break
16:00	-	16:45	Brainstorming session
16:45	-	17:00	Break
17:00	-	17:45	Public lecture by Yann Bugeaud
18:30	-	22:00	Conference banquet honoring Jan-Hendrik Evertse

Thursday

09:00	-	09:45	Matilde Lalín
09:45	-	10:15	Coffee break
10:15	-	11:00	Faustin Adiceam
11:00	-	11:15	Break
11:15	-	12:00	Annette Huber-Klawitter
12:00	-	13:30	Lunch
13:30	-	15:30	Breakout groups
15:30	-	21:00	Excursion and dinner sponsored by the Lorentz Center

Friday

09:00	-	09:45	Cristiana Bertolin
09:45	-	10:15	Coffee break
10:15	-	11:00	Reporting session
11:00	-	11:15	Break
11:15	-	12:00	Charlene Kalle
12:00	-	13:30	Lunch
13:30	-	14:15	Kálmán Győry
14:15	-	15:00	Farewell coffee

Abstracts

Faustin Adiceam

- **Title:** On the $P(t)$-adic Littlewood conjecture
- **Abstract:** Given an irreducible polynomial $P(t)$ over a ground field, the $P(t)$-adic Littlewood conjecture ($P(t)$-LC) refers to a function field analogue of the Littlewood conjecture in Diophantine approximation. In joint work with Dzmitry Badziahin (University of Sydney), we show that it fails over any ground field with characteristic $p \equiv 3 \bmod 4$, the counterexample being constructed from the automatic paperfolding sequence.

  Previously, this was only known in small characteristics thanks to ad hoc computer assisted proofs. The current result explains the arithmetic obstruction for the paperfolding sequence to meet $P(t)$-LC, namely that -1 is not a quadratic residue modulo any prime $p \equiv 3 \bmod 4$. Beyond disproving $P(t)$-LC in infinitely many characteristics, the existence of such arithmetic obstruction also provides a clear picture of the way $P(t)$-LC should fail in all other odd characteristics.

Shabnam Akhtari

- **Title:** Thue equations and their applications
- **Abstract:** Let $F(x, y)$ be a binary form of degree at least 3 which is irreducible over the rationals. For any fixed non-zero integer m, Thue showed that the equation $F(x, y) = m$ has at most finitely many solutions in integers x, y. I will discuss some fundamental work on bounding the number of integral solutions of such equations. Then I will share some of my related results, including current work in progress which aims to explore some properties of monogenic quartic rings.

Cristiana Bertolin

- **Title:** Variations on Schanuel Conjecture for elliptic and quasi-elliptic functions: the split case
- **Abstract:** It is expected that Schanuel Conjecture contains all "reasonable" statements that can be made on the values of the exponential function. In particular it implies the Lindemann-Weierstrass Theorem and the Conjecture on algebraic independence of logarithms of algebraic numbers.

  Our goal is to state conjectures à la Schanuel, which imply conjectures à la Lindemann-Weierstrass, for the exponential map of an extension of an elliptic curve by the multiplicative group. In this talk we assume that the extension is split. We propose the split semi-elliptic Schanuel Conjecture, which involves the exponential function and the Weierstrass $\wp$ and ζ functions, related with integrals of the first and second kind. We expect that our conjectures contain all "reasonable" statements that can be made on the values of these functions.

Alin Bostan

- **Title:** Deciding the algebraic nature of D-finite power series
- **Abstract:** A power series is said to be D-finite "differentially finite") if it satisfies a linear differential equation with polynomial coefficients. D-finite power series are ubiquitous in combinatorics, number theory and mathematical physics. In his seminal article on D-finite functions [S1], Richard P. Stanley asked for "an algorithm suitable for computer implementation" to decide whether a given D-finite power series is algebraic or transcendental. Although Stanley insisted on the practical aspect of the targeted algorithm, at the time he formulated the problem it was unknown whether the task of recognizing algebraicity of D-finite functions is decidable even in theory. We first prove such a decidability result. The corresponding algorithm has too high a complexity to be useful in practice. This is because it relies on the costly algorithm from [S2], which involves, among other things, factoring linear differential operators, solving huge polynomial systems and solving Abel's problem. I will then present an answer to Stanley's question based on "minimization" of linear differential equations, and illustrate it through examples coming from combinatorics and number theory. (Work in collaboration with Bruno Salvy and Michael F. Singer.)

[S1] R. P. Stanley, Differentiably finite power series. European J. Combin. 1 (1980), no. 2, 175-188.

[S2] M. F. Singer, Algebraic solutions of nth order linear differential equations. Proc. Queen's Number Theory Conf. 1979, Queen's Papers in Pure and Appl. Math., 54 (1980), 379–420.

Yann Bugeaud

- **Title:** Wandelen met Jan-Hendrik
- **Abstract:** During this walk with Jan-Hendrik, we will meet S-unit equations, Roth's Theorem, the Schmidt Subspace Theorem and its quantitative form, along with polynomial root separation and several open questions.

Sam Chow

- **Title:** Smooth discrepancy and Littlewood's conjecture
- **Abstract:** We establish a deterministic analogue of Beck's local-to-global principle for Kronecker sequences. This gives rise to a novel reformulation of Littlewood's conjecture in diophantine approximation.

Sander Dahmen

- **Title:** Formalizing Diophantine theory and computations
- **Abstract:** We begin by presenting some recent results on explicitly solving Diophantine equations, with a focus on certain generalized Fermat equations. We then explore possibilities and challenges involved in (partially) formalizing such results using a proof assistant like Lean. Next to the more theoretical aspects, special attention is given to the formalization of computational results.

Kálmán Győry

- **Title:** Effective reduction theory of integral polynomials of given discriminant
- **Abstract:** We give a survey on the effective reduction theory of integral polynomials of given discriminant and its applications. For polynomials in $\mathbb{Z}[X]$, the classical $\mathbb{Z}$-equivalence and $\mathrm{GL}(2,\mathbb{Z})$-equivalence preserve the degree and discriminant as invariants. The effective reduction theory we consider asks to find, for a given polynomial f, a $\mathbb{Z}$-equivalent or $\mathrm{GL}(2,\mathbb{Z})$-equivalent integral polynomial whose coefficients are effectively bounded above in terms of the degree and discriminant of f. We discuss the classical effective results of this type of Lagrange (1773) and Hermite (1851) on quadratic and cubic polynomials, the general ineffective result of Birch and Merriman (1972) and the general effective finiteness theorems of Győry (1973), obtained independetly, and of Evertse and Győry (1991) who settled the above mentioned problem in full generality, using Győry's effective results on unit equations whose proofs involves Baker's theory of logarithmic forms. Together with Bhargava, Evertse, Remete and Swaminathan, in 2023 we compared our general effective theorems mentioned above with a long-forgotten result of Hermite (1857), who used another notion of equivalence, and we pointed out that this is weaker than $\mathbb{Z}$-equivalence and $\mathrm{GL}(2,\mathbb{Z})$-equivalence. This inspired us with Evertse to write a longer joint survey paper on the subject and give this survey talk. We plan to give a brief overview of several older and recent consequences, e.g. for monogenic number fields, monogenic and rationally monogenic orders, and of various applications and generalizations of the effective reduction theory and related topics.

Annette Huber-Klawitter

- **Title:** 1-Motives and Transcendence

- **Abstract:** 1-Periods are complex number defined by integrating algebraic differential forms over paths (on algebraic varieties) with algebraic end points. The set contains many interesting numbers like $\log(2)$ or π that have been studied intensely in transcendence theorem.

  By the linear version of the Period Conjecture (a theorem of Wüstholz and myself in this case), all relations between them are described in terms of 1-motives. In this expository talk, we will explain this result and give a couple of examples.

Oleksiy Klurman

- **Title:** Extremal problems about Mahler measure
- **Abstract:** Mahler measure of polynomials is a classical topic on the interface of analysis and number theory. I will discuss how ideas from probability allow to compute the exact asymptotic of the Mahler measure of well-known Rudin-Shapiro and Fekete polynomials as well as make progress on an old problem of Borwein and Mahler (constructing polynomials with coefficients -1 and +1 with large Mahler measure).

Charlene Kalle

- **Title:** Lüroth normal numbers
- **Abstract:** In integer base expansions normal numbers are numbers with expansions in which all possible combinations of digits appear with the expected frequency: if the base is N, then each block of m digits should appear with frequency $1/N^m$. It was proven by Borel in 1909 that Lebesgue almost all numbers are normal with respect to each integer base N larger than 1. Also for other types of number expansions one can define a concept of normal numbers, even when the set of available digits is infinite. In this talk we introduce a family of numbers for which the Lüroth expansion is normal. This is joint work with Aafko Boonstra.

Matilde Lalín

- **Title:** Areal Mahler measure via random walks: steps in the complex plane
- **Abstract:** The (logarithmic) Mahler measure of a non-zero rational function P in n variables is the average of $\log|P|$ over the unit n-torus. It is connected to special values of L-functions and other arithmetic functions. In 2008 Pritsker introduced a related notion, the areal Mahler measure, by averaging over the product of n open unit disks instead. In this talk, we will investigate some similarities and differences between the two versions of Mahler measure. We will also discuss some evaluations of the areal Mahler measure of multivariable polynomials using random walks, which also yield special values of L-functions. This talk includes joint work with Siva Sankar Nair, Berend Ringeling, and Subham Roy.

Nicole Looper

- **Title:** The Tate–Voloch conjecture and applications to the arithmetic of abelian varieties
- **Abstract:** The Tate–Voloch conjecture says that given a closed subvariety X of a semiabelian variety G over $\mathbb{C}_p$, the distance between X and any torsion point in $G \setminus X$ is uniformly bounded away from 0. This conjecture was proved by Scanlon in the case where G is defined over $\overline{\mathbb{Q}_p}$. In this talk I will present how this conjecture may be approached via difference equations, as well as applications to integral torsion points on abelian varieties.

Florian Luca

- **Title:** On large zeros of linear recurrence sequences

- **Abstract:** The Skolem Problem asks to determine whether a given integer linear recurrence sequence (LRS) has a zero term. This problem, whose decidability has been open for many decades, arises across a wide range of topics in computer science, including loop termination, formal languages, automata theory, and probabilistic model checking, amongst many others. In the present paper, we introduce a notion of "large" zeros of linear recurrence sequences, i.e., zeros occurring at an index larger than a sixth-fold exponential of the size of the data defining the given LRS. We establish two main results. First, we show that large zeros are very sparse: the set of positive integers that can possibly arise as large zeros of some LRS has null density. This in turn immediately yields a Universal Skolem Set of density one, answering a question left open in the literature. Second, we define an infinite set of prime numbers, termed "good", having density one amongst all prime numbers, with the following property: for any large zero of a given LRS, there is an interval around the large zero together with an upper bound on the number of good primes possibly present in that interval. The bound in question is much lower than one would expect if good primes were distributed similarly as ordinary prime numbers, as per the Cramér model in number theory. We therefore conjecture that large zeros do not exist, which would entail decidability of the Skolem Problem.

  This research is supported by the 2024 ERC Synergy Project DynAMiCs.

Alina Ostafe

- **Title:** On the Skolem Problem for parametric families of linear recurrences
- **Abstract:** In this talk I will discuss recent results about the Skolem problem for specialisations of linear recurrences defined over a function field. More precisely, given rational functions $a_1, \ldots, a_k, f_1, \ldots, f_k$ defined over a number field, for all but a set of elements α of bounded height in the algebraic closure of $\mathbb{Q}$, the Skolem problem is solvable for the linear recurrence

$$F_n(\alpha) = a_1(\alpha)f_1(\alpha)^n + \cdots + a_k(\alpha)f_k(\alpha)^n, \qquad n \geq 0,$$

  and the existence of a zero can be effectively decided. Moreover, in the case $k = 3$, when we restrict to specialisations α that are roots of unity, we give uniform bounds, depending only on the initial data a_i, f_i, $i = 1, \ldots, k$, on the largest zero $n \geq 0$ such that $F_n(\alpha) = 0$. If time allows I will also briefly discuss connections to certain gcd problems for linear recurrences.

  These are joint works with Philipp Habegger, David Masser and Igor Shparlinski.

Joël Ouaknine

- **Title:** Fragments of Hilbert's Program
- **Abstract:** Hilbert's dream of mechanising all of mathematics was dealt fatal blows by Gödel, Church, and Turing in the 1930s, almost a hundred years ago. Paradoxically, assisted and automated theorem proving have never been as popular as they are today! Motivated by algorithmic problems in discrete dynamics, non-linear arithmetic, and program analysis, we examine the decidability of various logical theories over the natural numbers, and discuss a range of open questions at the intersection of logic, automata theory, and number theory.

Joe Silverman

- **Title:** A Trichotomy for Height Counting Functions and Wide Spacing of Orbits in Arithmetic Dynamics
- **Abstract:** This lecture centers on two conjectures. The first is 35 years old and says roughly that an appropriately defined counting function for the rational points on an algebraic variety can have only one of three possible growth-rates, namely polynomial, log-power, or bounded. Recently Hector Pasten and I observed that this trichotomy conjecture leads to interesting phenomena for the spacing of orbits of rational points under iteration of a self-morphism of a variety. I will describe two orbit wide-spacing conjectures, and as time permits, sketch proofs of the conjectures in a number of cases.

James Worrell

- **Title:** Pisot sequences and transcendence
- **Abstract:** It was recently shown that for an automatic sequence (u_n) and an algebraic number b with $|b| > 1$, the number $\sum_n u_n/b^n$ either lies in $\mathbb{Q}(b)$ or is transcendental. In this talk we show a similar rational-transcendental dichotomy for sequences defined by irreducible Pisot morphisms over a binary alphabet. Subject to the Pisot conjecture, we generalise the latter result to arbitrary finite alphabets. In certain cases we are able to show transcendence of outright. In particular, if (u_n) is the k-bonacci word then $\sum_n u_n/b^n$ is transcendental.

  This is joint work with Pavol Kebis, Florian Luca, Joel Ouaknine and Andrew Scoones.