SCHEDULE OF TALKS

(All talks in the Conference Center of the Grand Hotel San Michele)

Monday, July 20

9:30 - 10:20: Pietro Corvaja: Around the Chevalley-Weil Theorem

We shall investigate situations in which an algebraic curve Y admits two morphisms (of different degrees) to a single algebraic curve X, one of which is unramified. As an arithmetic application, based on the Chevalley-Weil theorem, we construct certain infinite towers of number fields, unramified outside finite sets of primes. This is a joint work with J. Demeio, F. Zucconi and U. Zannier.

10:30 - 11:00: Coffee Break

11:00 - 11:50: Davide Lombardo:

On the scarcity of rational points on ramified covers of abelian varieties

Let A be an abelian variety defined over a number field K, and suppose that $A(K)$ is Zariski-dense in A. We show that, for every irreducible ramified cover $\pi : X \to A$, the set $A(K) \setminus \pi(X(K))$ is still Zariski-dense in A; in fact, it contains a coset of a finite-index subgroup of $A(K)$. This result is motivated by Lang's conjecture on rational points on varieties of general type, and confirms a conjecture of Corvaja and Zannier concerning the weak Hilbert property in the case of abelian varieties. This is joint work with P. Corvaja, J. Demeio, A. Javanpeykar, and U. Zannier.

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17:00 - 17:50: Robin Zhang:

A Lie-theoretic trichotomy for positive integral points on Mordell-Schinzel surfaces

For two-variable polynomials $G \in \mathbb{Z}[x, y]$, there is no known classification of integral points on the surfaces $xyz = G(x, y)$. I will discuss a positive analogue of this problem, in which both the coefficients of G and the integral points are required to be positive, and explain how this variant admits a complete Lie-theoretic classification. The proof combines the Killing–Cartan classification of semisimple Lie algebras, a dynamical argument from a 1952 paper of Mordell, and the theory of cluster algebras. Hidden in this Diophantine problem are classical questions of Gauss, Coxeter, and Conway on the combinatorics of frieze patterns. This talk is partially based on joint work with Antoine de Saint Germain.

18:00 - 18:50: Bianca Viray:

Unlikely ramification in residue fields of points on curves

An accepted truism in arithmetic geometry is that curves of genus at least 2 have more complicated arithmetic than curves of genus 0 or 1. One way this is made precise is by Faltings's Theorem: any curve of genus at least 2 has only finitely many points over any number field. Another possibility for making this precise is to show that there are many number fields that cannot appear as the residue field of points on a fixed curve of genus at least 2. In this talk, we report on results in this direction, joint with Isabel Vogt.

Tuesday, July 21

9:30 - 10:20: Jason Bell: Height gaps and the Polya-Carlson dichotomy

A century-old theorem of Polya and Carlson asserts a remarkable rigidity: a power series with integer power series of radius of convergence one is either a rational function or it admits the unit circle as a natural boundary. In this talk, we survey a recent arithmetic incarnation of this dichotomy in which logarithmic Weil height emerges as the natural measure of complexity.

For several natural classes of power series, including D-finite series (those satisfying a homogeneous linear differential equation with rational function coefficients), Mahler functions (those satisfying certain difference equations), and Artin-Mazur zeta functions, one finds that analogous phenomena hold: either the series is as simple as it can possibly be (e.g., rational, algebraic, automatic, etc.) or the heights of coefficients are forced to grow at least a certain rate and the circle of convergence becomes a genuine wall. We will explain how these results yield height gap results and talk about an unexpected connection to the so-called Dynamical Mordell-Lang conjecture. This includes joint work with Boris Adamczewski, Shaoshi Chen, Keira Gunn, Khoa Nguyen, J. C. Saunders, Daniel Smertnig, and Umberto Zannier.

10:30 - 11:00: Coffee Break

11:00 - 11:50: Ian Whitehead: Arithmetic Polyhedra

The celebrated Koebe-Andreev-Thurston Theorem gives a canonical mapping from abstract polyhedra to discrete, finite-covolume reflective subgroups of the isometry group of hyperbolic 3-space. We give a complete classification of polyhedra whose associated subgroups are arithmetic. They are: the tetrahedron, cube, octahedron, cubeoctahedron, rhombic dodecahedron, and certain polyhedra constructed with these as building blocks. The proof uses classifications of quadratic forms, hyperbolic geometry, and combinatorial geometry. The result has applications to knot theory and integral circle packings. This is joint work with Allcock, Devlin, Felikson, and Kontorovich.

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17:00 - 17:50: Ryan Chen: Lang–Vojta and Degeneration

For a general type smooth projective variety X over a number field, the Bombieri–Lang conjecture predicts that the rational points on X are Zariski non-dense. The Lang–Vojta conjecture extends this to integral points, for complements of divisors $D \to X$ with (X, D) of log general type. Towards these questions, we use a degeneration technique to answer a question of Achenjang–Morrow: we show that every normal projective variety X (with $\dim(X) \geq 2$) admits a geometrically irreducible divisor D with finiteness of D-integral points. We also use our technique to construct explicit irreducible divisors D on $\mathbb{P}^2$ with finiteness of D-integral points.

This is joint work with Natalia Garcia-Fritz, Siddharth Mathur, and Hector Pasten.

18:00 - 18:50: Mingjia Zhang: Bounds on eigenvalues of Hecke operators

In a joint work with Ana Caraiani and Linus Hamann, we give a new proof of the Eichler-Shimura congruence relations on the intersection cohomology of certain PEL type Shimura varieties, which builds on the strategy developed by Xiao-Zhu, Koshikawa, as well as my joint work with Daniels, van Hoften and Kim. Following Deligne's proof of the Ramanujan conjecture, I will explain how this can be used to deduce some bounds on the Hecke eigenvalues on discrete automorphic representations of the relevant groups.

Wednesday, July 22 (Morning)

9:30 - 10:20: Jit Wu Yap:

Uniform boundedness of torsion points for abelian varieties over function fields

Let K be the function field of a curve B over $\mathbb{C}$ and A/K an abelian variety with trivial trace. The uniform boundedness conjecture predicts that the number of torsion points in $A(K)$ is bounded solely in terms of $\dim A$ and K. In this talk, I will present a proof of this conjecture and also discuss some related questions. This is joint work with Nicole Looper.

10:30 - 11:00: Coffee Break

11:00 - 11:50: Lu Weixiao:

Faltings height and subleading term of adjoint L-function

Colmez's conjecture predicts that Faltings heights of CM abelian varieties appear in subleading terms of certain Artin L-functions. An averaged version is known by the work of Andreatta–Goren–Howard–Madapusi and Yuan–Zhang. We propose a generalized problem relating diagonal cycles on $(n-1)$-dimensional unitary Shimura varieties and adjoint L-functions of certain automorphic representations of $U(n)$. The case $n = 1$ is (a variant of) the averaged Colmez conjecture. I will explain the origin of our conjecture, discuss our predictions in the general case motivated by the relative Langlands program, and report on our results in the case of $n = 2$, via twisted Jacquet-Zagier relative trace formula. This is joint work in progress with Ryan Chen and Wei Zhang.

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Wednesday, July 22 (Afternoon)

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16:30 - 17:20: Thomas Krämer:

Perverse sheaves and the Shafarevich conjecture

The Shafarevich conjecture predicts that over any number field there are only finitely many isomorphism classes of smooth projective canonically polarized varieties with given Hilbert polynomial and good reduction outside a given finite set of primes. For curves this was famously proven by Faltings on his way to the Mordell conjecture, but the higher-dimensional case remains wide open.

In the talk I will discuss joint work with Marco Maculan in which we prove the Shafarevich conjecture for a large class of varieties with globally generated cotangent bundle. We combine the Lawrence-Sawin-Venkatesh method with the big monodromy theorem from our work with Javanpeykar, Lehn and Maculan; the key input is the convolution of perverse sheaves on abelian varieties.
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17:30 - 18:20: Wanlin Li:

Algebraic cycles associated to curves

Following the work of Griffiths, a homologically trivial algebraic cycle characterizes a class of extensions of mixed Hodge structures. Furthermore, a family of such cycles characterizes a variation of mixed Hodge structures in the form of a normal function. In the work of Hain, quotients of the fundamental group of a curve in its lower central series carry mixed Hodge structures, and there exist normal functions over the moduli of curves associated to them. For curves of genus g¿2, there exists a normal function over M_g associated to the Ceresa cycle/modified diagonal cycle corresponding to the Hodge structure on the second nilpotent quotient of the fundamental group. The Ceresa normal function vanishes on the hyperelliptic loci. In this talk, I will discuss recent developments on the study of vanishing loci of the Ceresa normal function and constructions of explicit higher Chow cycles which give rise to nontrivial normal functions on the hyperelliptic loci.

18:30 - 19:00: AWARDING OF THE DAVID GOSS PRIZE

Thursday, July 23

9:30 - 10:20: Marco Antonio Sangiovanni Vincentelli:

The holomorphic part of Ohta's theorem for Hilbert modular forms

Ohta described the ordinary part of the étale cohomology of towers of modular curves in terms of Hida families. Ohta's approach crucially depended on the one-dimensional nature of modular curves. In this talk, I will present joint work with Chris Skinner which generalizes Ohta's results to Hilbert modular varieties. Our approach is based on the framework of integral p-adic Hodge theory, as developed by Bhatt–MorrowScholze.

10:30 - 11:00: Coffee Break

11:00 - 11:50: Jesse Thorner:

New zero-free regions for L-functions

I will discuss new, ongoing work on bounds for the greatest real zero of an L-function with uniformity in the analytic conductor.

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17:00 - 17:50: Alex Pascadi:

On sums of Kloosterman fractions

Linear forms with Kloosterman fractions are a common type of exponential sums that arise in analytic number theory, particularly in problems about the distribution of L-functions on the half-line and the distribution of primes in arithmetic progressions. We will discuss improved bounds for bilinear and trilinear forms with Kloosterman fractions, building on the works of Duke-Friedlander-Iwaniec and Bettin-Chandee on this topic. Unlike previous approaches for the setting of arbitrary coefficients, we use the spectral theory of automorphic forms, relying on new ingredients in the exceptional spectrum. We will briefly mention some applications.

18:00 - 18:50: Alexandre de Faveri: TBA

Friday, July 24

9:30 - 10:20: Carlo Pagano::

On Chowla's non-vanishing conjecture

I will present joint work with P. Koymans and M. Shusterman, establishing that for each q congruent to 1 modulo 8, one has that $L(1/2, \chi)$ is non-zero $for 100\%$ of imaginary quadratic characters χ of $F_q(T)$. This settles the function field side of Chowla's non-vanishing conjecture.

10:30 - 11:00: Coffee Break

11:00 - 11:50: Danny Neftin:

Reducibility of the Curves $f(X) = g(Y)$ and Polynomial Monodromy

The classical Davenport–Lewis–Schinzel (DLS) problem concerns the reducibility of the curves $f(X) = g(Y)$ over the complex numbers. The heart of this problem lies in studying the monodromy groups of polynomial maps. This involves studying their actions on trees, the Fano plane, and several other geometries. We shall discuss recent advancements in this study, and how these are used to resolve the DLS problem, and address related problems. Joint work with Angelot Behajaina and Joachim König.

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17:00 - 17:50: Tangli Ge:

Bounded heights in the just likely loci on abelian schemes

I will talk about a unification of two kinds of bounded height results around abelian varieties. One is due to Silverman from 1983, which states, for an abelian scheme A/C on a curve C over a number field, that the set of points on C where the generic Mordell–Weil group fails to specialize injectively has bounded height. The other is by Habegger in 2008 inside one abelian variety: a geometrically nondegenerate subvariety can be intersected with the union of torsion cosets up to complementary dimensions to give a set of bounded height. I will discuss the main idea of the proof, including the application of the mixed Ax–Schanuel theorem of Gao.