Women in automorphic forms

Oct 4–Oct 6, 2023

SCHEDULE

Schedule	**Wednesday**	**Thursday**	**Friday**
08.30 – 09.00	Registration		
09.00	Opening		
09.10 – 10.00	**Wendland**	**Ernvall-Hytönen**	**Burmester**
10.10 – 10.40	Coffee break	Coffee break	Coffee break
10.40 – 11.30	**Jochemko**	**Imamoglu**	**Burrin**
11.30 – 12.30	**Short talks**	**Short talks**	**Im**
12.30 – 14.00	Lunch break	Lunch break	Departure
14.00 – 14.50	**Bengoechea**	**Vignéras**	
15.00 – 15.30	Coffee break	Coffee break	
15.30 –	Free discussion	Free discussion	
18.30 –	Conference dinner		

LOCATION

The lectures will take place in the

Lecture Hall R0611

which is situated on the first floor of building R ("R-Gebäude"). The coffee breaks take place in the room K0503 on the ground floor nearby "Al stuDente" (Pasta bar) in the main building. In the afternoon, after the coffee break, you have the possibility to meet in room G0227 in building G.

CONFERENCE DINNER

The conference dinner (for registered participants) is scheduled for **Wednesday, October 4th, at 18.30**. The venue for this dinner is the restaurant Wessenberg, Wessenbergstraße 41, 78462 Konstanz.

TITLES AND ABSTRACTS – TALKS

Paloma Bengoechea

Markov numbers and continuity of cycle integrals

Cycle integrals are the integrals of a modular function along hyperbolic geodesics which endpoints are the two roots of an indefinite binary quadratic form with integer coefficients. They enjoy similarities with singular moduli in the setting of real quadratic fields, and however there is still a big lack of information on these values. We will talk about Markov discoveries on what we now call Markov's surface, Markov's geodesics and Markov-Hurwitz's tree. We will show how cycle integrals of modular functions turn out to be continuous on Markov-Hurwitz's tree.

Annika Burmester

The algebra of multiple q-zeta values and multiple Eisenstein series

We introduce the algebra $\mathcal{Z}_q$ of multiple q-zeta values, which are particular q-series degenerating to multiple zeta values under the limit $q \to 1$. Multiple zeta values possess two product expressions, which are together with some regularization process conjectured to give all algebraic relations among them. We explain a similar structure for the algebra $\mathcal{Z}_q$ in terms of the balanced multiple q-zeta values. This should also give a complete description of the algebraic relations between multiple Eisenstein series introduced by Ihara-Kaneko-Zagier, the connection is given by the combinatorial multiple Eisenstein series. In the end, we will outline how Racinet's techniques for multiple zeta values could reveal a Hopf algebra structure on a quotient of $\mathcal{Z}_q$.

Claire Burrin

Rational points on the unit sphere

In this talk I will discuss my current favorite illustration of the *unreasonable effectiveness of modular forms* at the hand of the problem of quantifying the density of rational points on the sphere (or more generally on multidimensional ellipsoids). This is joint work with Matthias Gröbner.

Anne-Maria Ernvall-Hytönen

Lattices and modular forms in coset coding

Lattices can be used in various ways in communications. During this (survey) talk, I will briefly explain how lattices can be used in coset coding in a so called wiretap channel, and how properties of modular forms can be used to decide which lattices are good for coding.

Bo-Hae Im

MZV's in positive characteristic: Zagier-Hoffman's conjectures and the Hopf algebra structure

Zagier-Hoffman's conjectures in the classical setting on multiple zeta values over $\mathbb{Q}$ of Euler and Euler sums are still open. As analogues of the classical case, multiple zeta values and alternating multiple zeta values in positive characteristic were introduced by Thakur and Harada. In this talk, we determine the dimension and a basis of the span of all alternating multiple zeta values over the rational function field by finding all linear relations among them. As a consequence, we completely establish Zagier-Hoffman's conjectures in positive characteristic formulated by Todd and Thakur which predict the dimension and an explicit basis of the span of multiple zeta values of Thakur of fixed weight. Also we prove the Hopf algebra structure of MZV's.
These are joint works with Hojin Kim, Khac Nhuan Le, Tuan Ngo Dac, and Lan Huong Pham.

Özlem Imamoglu

Title

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Katharina Jochemko

Weighted Ehrhart Theory: Extending Stanley's Nonnegativity Theorem

The Ehrhart polynomial of a lattice polytope counts the number of lattice points in positive integer dilates of the polytope. A fundamental theorem by Stanley states that the Ehrhart polynomial, expressed in a particular binomial basis, has only nonnegative coefficients. In this talk, we present generalizations of this and related results to weighted integer point counting in rational polytopes where the weights are given by polynomial functions. In particular, we show that Stanley's Nonnegativity Theorem extends to weights given by homogeneous polynomials decomposable as sums of products of linear forms that are nonnegative over the polytope. This is joint work with Esme Bajo, Robert Davis, Jesús de Loera, Alexey Garber, Sofía Garzón Mora and Josephine Yu.

Marie-France Vignéras

Restriction of representations of $GL_2(D)$ to small congruence subgroups

Let F be a finite extension of Q_p or $F_p((t))$, D/F a finite dimensional division central F-algebra, $G = GL_2(D)$.
For any irreducible admissible complex representation π of G, there exist two integers a_π, b_π such that the restrictions of π and of the virtual representation $a_\pi 1_G + b_\pi \, ind_B^G 1_B$ to a small enough congruence subgroup, are isomorphic. Here ind_B^G is the smooth compact induction from a parabolic subgroup B to G. What are the values of a_π, b_π ? Let ℓ be a prime number. Does this result remain true for mod ℓ representations ? Does it generalize to representations of $SL_2(F)$? to other groups ? This is work in progress with Guy Henniart.

Katrin Wendland

The Gepner construction from a modular point of view

The Gepner models are very special, well-established conformal field theories, which can be obtained by a construction that solely uses combinatorial data. The resulting theories in particular possess partition functions which have beautiful modular properties. The talk will give an introduction to the Gepner construction, highlighting some of the mysteries arising from it. We will focus on the partition functions and their building blocks, which can be studied without any background knowledge from quantum field theory.

TITLES AND ABSTRACTS – SHORT TALKS (WEDNESDAY)

Rebekka Strathausen

Katok–Sarnak formulas and theta lifts

Katok–Sarnak formulas give a relation between periods of Maass cusp forms of integral weight and Fourier coefficients of Maass cusp forms of half integral weight. They provide a powerful tool in studying equidistribution problems, for example that of Heegner points on the modular curve. This talk aims to give a brief overview of the methods applied to prove formulas of the Katok–Sarnak type with special regard to those related to theta lifts.

Paul Kiefer

The Millson-lift in signature $(2,2)$

We investigate the Millson-lift in signature $(2,2)$ and show its relation to the Shintani-lift in signature $(2,2)$. As a special case one obtains the Fourier expansion of the Shintani-lift of a holomorphic cusp form in terms of its cycle integrals. This is joint work with Claudia Alfes-Neumann and Markus Schwagenscheidt.

Sarah Hess

A refinement of Hilbert's 1888 theorem

The cone $\mathcal{P}_{n+1,2d}$ of all positive semidefinite real forms in $n+1$ $(n \geq 1)$ variables of degree $2d$ $(d \geq 1)$ contains the subcone $\Sigma_{n+1,2d}$ of all forms that are representable as finite sums of squares of forms of half degree. In 1888, Hilbert showed in a seminal paper that $\Sigma_{n+1,2d} = \mathcal{P}_{n+1,2d}$ exactly in the *Hilbert cases* $n+1=2$ or $2d=2$ or $(n+1,2d)=(3,4)$.
In this talk, we firstly construct a filtration of intermediate cones between $\Sigma_{n+1,2d}$ and $\mathcal{P}_{n+1,2d}$ along a filtration of irreducible projective varieties containing the Veronese variety. Secondly, we investigate this cone filtration for proper inclusions in any non-Hilbert case and, thus, thirdly present a refinement of Hilbert's 1888 Theorem. This is a joint work with Charu Goel and Salma Kuhlmann.

Yasuko Hasegawa

The second terms of the Eisenstein series on $\mathrm{Sp}(2)$

In this talk, I will introduce an one of the important theorems of number theory and arithmetic geometry, the classical Kronecker's first limit formula, and show its generalization for the Siegel-Eisenstein series. As a future application, I will introduce some direction to show similar formulas for the other Eisenstein series on the symplectic group.

TITLES AND ABSTRACTS – SHORT TALKS (THURSDAY)

Laura Breitkopf

Distribution of Stern–Brocot sequences generalized to Hecke triangle groups

The Stern–Brocot sequence, known from number theory, can be studied within the framework of dynamical systems. To do so, the sequence is constructed from a continuous transformation, the Farey mapping. We construct new generalized Stern–Brocot sequences through a generalization of the Farey mapping by means of Hecke triangle groups. In this talk, we discuss our recent contributions to the study of their properties, which involves methods from infinite ergodic theory. In particular, we reproduce a distribution result of Keßeböhmer and Stratmann for the classical Stern–Brocot sequence and extend it to our generalized sequences. This is joint work with Anke Pohl and Marc Keßeböhmer.

Ingmar Metzler

Theta lifts on locally symmetric spaces and special cycles

Theta lifts have long been known for constructing examples of automorphic forms in different settings. The Borcherds lift, for instance, gives rise to remarkable product expansions in the orthogonal setting and allows to derive relations for special divisors. It is closely related to the Kudla-Millson lift which has been proven to be injective in a variety of cases by Bruinier, Funke, and Stein. We employ two different methods to generalise these results – one in joint work with Riccardo Zuffetti.

Eugenia Rosu

Special cycles on compactifications of Shimura varieties

I will discuss ongoing work with Jan Bruinier and Shaul Zemel on constructing special cycles of dimension 0 on toroidal compactifications of Shimura varieties. We show the modularity of the generating series that have these special cycles as coefficients, generalizing the compact case.