Automorphic forms and number theory
Formes automorphes et théorie des nombres
(Org: **Lior Silberman** (University of British Columbia), **Nahid Walji** (University of British Columbia) and/et **Tian An Wong** (University of Michigan - Dearborn))

AMIR AKBARY, University of Lethbridge
Dual pairs of eta quotients

The Dedekind eta function is defined by the infinite product

$$\eta(z) = e^{\pi i z/12} \prod_{n=1}^{\infty} (1 - e^{2\pi i n z}).$$

An eta quotient of level N is a function of the form

$$f(z) = \prod_{t|N} \eta^{r_t}(tz),$$

where the exponents r_t are integers. We call a pair (f, g) of eta quotients a dual pair if the derivative of f is a constant multiple of g. In this talk, we determine the dual pairs of eta quotients of prime power levels. We achieve this by finding upper bounds for orders of zeros (at cusps) of a class of Eisenstein series of weight 2 and prime power level. This is joint work with Zafer Selcuk Aygin (American University of Sharjah).

KHALIL BESROUR, University of Ottawa
Modular Solutions to Modular Differential Equations

In this talk, we investigate the modular differential equation $y'' + F(z)y = 0$ on the upper half-plane , where F is a weight 4 modular form for $\Gamma_0(2)$. Our method involves solving the associated Schwarzian equation $\{h, z\} = 2F(z)$, where $\{h, z\}$ denotes the Schwarzian derivative of a meromorphic function h. We will establish the conditions under which the solutions to this equation are modular functions for subgroups of the modular group, and we provide explicit expressions for these solutions in terms of classical modular functions.

SARAH DIJOLS, University of British Columbia
Parabolically induced representations of p-adic G2 distinguished by SO4

Distinguished representations are representations of a reductive group G on a vector space V such that there exists a H-invariant linear form for a subgroup H of G. They intervene in the Plancherel formula in a relative setting, as well as in the Sakellaridis-Venkatesh conjectures for instance. I will explain how the Geometric Lemma allows us to classify parabolically induced representations of the p-adic group G_2 distinguished by SO_4. In particular, I will describe a new approach, in progress, where we use the structure of the p-adic octonions and their quaternionic subalgebras to describe the double coset space $P\backslash G_2/SO_4$, where P stands for the maximal parabolic subgroups of G_2.

JULIA GORDON, University of British Columbia
Explicit improvement on Harish-Chandra's integrability bound

It is a well-known result of Harish-Chandra that many invariant distributions on real and p-adic reductive groups (e.g., Fourier transforms of orbital integrals, and characters of representations) are represented by locally integrable functions on the group, and this function's singularities are 'smoothed' by the zeroes of the Weyl discriminant. In the recent joint work with Itay

Glazer and Yotam Hendel, we analyze the singularities of the inverse of the Weyl discriminant, and from that, obtain an explicit improvement on the integrability exponent of the Fourier transforms of nilpotent orbital integrals, and consequently, of characters. I will discuss this improvement and some surprising applications.

JENNIFER JOHNSON-LEUNG, University of Idaho
Index lowering operators on Jacobi forms and stable Klingen theory

I will introduce two new index-lowering operators on Jacobi forms which are dual to the Hecke operators U_p and V_p introduced by Eichler and Zagier. These operators were found by studying the action of stable Klingen operators on the Fourier-Jacobi expansions of paramodular Siegel modular forms, in joint work with Brooks Roberts and Ralf Schmidt. I will also explain the usefulness of the stable Klingen theory for computing paramodular forms of deep level.

KIMBALL MARTIN, University of Oklahoma
Distributions of root numbers and Fourier coefficients of modular forms

While asymptotically root numbers of modular forms are +1 half the time and -1 half the time, there is in fact a bias towards sign +1. Moreover, an unexpected correlation between root numbers and Fourier coefficients of modular forms, termed murmurations, was recently discovered. I will discuss these phenomena, along with analogues for local root numbers.

ISABELLA NEGRINI, University of Toronto
Modular generating series for rigid cocycles

Rigid cocycles were defined in 2017 by Darmon and Vonk and give a promising framework to extend the theory of complex multiplication to real quadratic fields, towards a theory of "real multiplication". They share striking parallels with modular forms, and their generalizations are the main ingredient in the emerging p-adic Kudla program. In this talk I will show how rigid cocycles can be used to build modular generating series.

NAOMI TANABE, Bowdoin College
Subconvexity for L-functions of Hilbert modular forms

This talk explores the subconvexity problem for GL_2 L-functions, a central challenge in analytic number theory. After outlining key developments in the field, I will discuss ongoing joint work with Keshav Aggarwal, focusing on refining approaches to this problem and improving bounds, particularly in the setting of totally real number fields.

LUCAS VILLAGRA TORCOMIAN, Simon Fraser University
The modular method for Generalized Fermat equations

Automorphic forms appear naturally when following the modular method to solve Diophantine equations of the form

$$Ax^q + By^r = Cz^p.$$

In this talk we will explore some of the limitations of this approach, as well as a particular family of equations that we focus on in a work in progress.