ITCAG Workshop: Titles and Abstracts

Siegel modular forms and higher algebraic cycles

Aleksander Horawa *Mo, 9:30*

University of Oxford

In recent work with Kartik Prasanna, we propose an explicit relationship between the cohomology of vector bundles on Siegel modular threefolds and higher Chow groups (a.k.a. motivic cohomology groups). For Yoshida lifts of Hilbert modular forms, we use a result of Ramakrishnan to prove our conjecture. For Yoshida lifts of Bianchi modular forms, we show that our conjecture implies the conjecture of Prasanna—Venkatesh.

Euler systems and refined conjectures of Birch and Swinnerton-Dyer type

Dominik Bullach *Tu, 13:30*

University College London

Ever since their introduction in the late 1980s, Euler systems have played an important role in progress on conjectures concerning the special values of L-series. In joint work in progress with David Burns, we refine the existing theory of Euler systems, and I will explain how these general results allow one to deduce new results towards conjectures of Mazur and Tate. The latter is joint work in progress with Matthew Honnor.

Local Iwasawa theory and Galois theory of $\mathbf{B}_{\mathrm{dR}}^{+}$

Gautier Ponsinet *Mo, 15:30*

University of Heidelberg

The study of the Bloch–Kato Selmer group associated with a Galois representation in Iwasawa theory leads to study the local Bloch–Kato groups over perfectoid fields. In this talk, we will relate the study of the local Bloch–Kato groups over perfectoid fields to the Galois theory of $\mathbf{B}_{\mathrm{dR}}^{+}$, allowing us to compute these local Bloch–Kato groups in new cases. We will then deduce from these computations results about the structure of the Bloch–Kato Selmer group.

On the denominators of the special values of the partial zeta functions of real quadratic fields

Hohto Bekki *Tu, 9:00*

MPIM, Bonn

It is classically known that the special values of the partial zeta functions of real quadratic fields, or more generally, of totally real fields at negative integers are rational numbers. Recently, Duke presented a conjecture which gives a universal upper bound for the denominators of these special values of the partial zeta functions of real quadratic fields. In this talk, I would like to explain that we can prove Duke's conjecture and moreover the sharpness of that upper bound using Harder's theory on the denominator of the Eisenstein class for SL$(2, \mathbb{Z})$. This is a joint work with Ryotaro Sakamoto.

Overconvergent Eichler—Shimura morphisms for Siegel modular forms

Ju-Feng Wu *Mo, 14:00*

University of Warwick

A classical theorem of Eichler and Shimura tells us that the Betti cohomology of modular curves can be understood by spaces of modular forms. This theorem admits an arithmetic avatar provided by Faltings. In the early 2010s, Andreatta—Iovita—Stevens announced a partial generalisation of this theorem to p-adic families by constructing the so-called 'overconvergent Eichler—Shimura morphisms'. In this talk, based on joint work with Hansheng Diao and Giovanni Rosso, I will explain how to use perfectoid method to construct the overconvergent Eichler—Shimura morphisms for Siegel modular forms. Such a strategy is inspired by the work of Chojecki—Hansen—Johansson in the case of automorphic forms over compact Shimura curves.

Iwasawa theory and mock plectic points

Michele Fornea *Tu, 15:00*

CRM Barcelona

Let p be a prime inert in a quadratic imaginary field K, and $E_{\mathbb{Q}}$ an elliptic curve of conductor p. Inspired by Nekovar and Scholl's plectic conjectures, H. Darmon and I recently constructed a global cohomology class Q_K – called mock plectic invariant – which belongs to the pro-p Selmer group of E_K whenever $L(E/K, 1) = 0$. This class arises from CM points on a "mock Hilbert modular surface" and it should help in shedding some light on the arithmetic intricacies of elliptic curves of rank two.

In this talk I will present joint work with L. Gehrmann on the uses of Iwasawa theory to study mock plectic invariants. More precisely, when $L(E/K, 1) = 0$ and Q_K does not vanish, we prove that the p-Selmer rank of E_K equals 2. Our proof rests on one inclusion of the Heegner point main conjecture for E_K which we obtain using bipartite Euler systems.

Combinatorial Eisenstein cocycles

Peter Xu *Tu, 10:30*

UCLA

We construct exact complexes from combinatorial/linear algebraic data with GL_n action in "toric" and "elliptic" analogues of the Orlik-Solomon complex, leading to explicit arithmetic group cocycles valued in cup products of cyclotomic, Siegel, or elliptic units, generalizing work of Sharifi-Venkatesh (and, in an orthogonal direction, work of Bergeron-Charollois-Garcia). We describe some arithmetic and representation-theoretic properties of these cocycles, as well as potential applications.

Symmetry in the theory of rigid meromorphic cocycles

Sören Sprehe *Mo, 11:00*

Universität Bielefeld

Around five years ago Darmon and Vonk initiated the theory of p-adic singular moduli for real quadratic fields by defining “rigid meromorphic cocycles". These are elements of the first cohomology group of Ihara’s group $\mathrm{SL}_2(\mathbb{Z}[1/p])$ with values in the group of rigid meromorphic functions on Drinfeld’s upper half-plane. Using rigid meromorphic cocycles Darmon and Vonk assign to each pair of real quadratic irrationalities a p-adic number. The two irrationalities play a vastly different role in the construction of this assignment. However, it is expected to behave like the difference of two classical singular moduli - in particular, it should be anti-symmetric in the argument. We will use the recent work of Darmon, Gehrmann and Lipnowski on rigid meromorphic cocycles for higher dimensional orthogonal groups to give a new, symmetric construction of this function. This is work in progress.