Iwasawa 2010

Abstracts

Agboola, Adebisi:

Special values of p-adic L-functions

We shall discuss the arithmetic of certain special values of the Katz two-variable p-adic L-function lying outside the range of p-adic interpolation.

Ardakov, Konstantin:

Irreducible representations of compact p-adic analytic groups

Let G be a compact p-adic analytic group whose Lie algebra is split semisimple. We will discuss the classification of the finite-dimensional irreducible $\mathbb{Q}_p$-representations of G and show that infinite dimensional irreducible representations are large in a certain precise sense.

Arnold, Trevor:

Euler system techniques over normal rings

The method of Euler systems is a fundamental tool in Iwasawa theory, but, for various technical reasons, can be difficult to apply to Galois representations on big rings. This talk discusses techniques for applying the Euler system theory to (sufficiently nice) ordinary Galois representations on modules over a general class of normal rings. The expected Euler system bound can be obtained away from a certain explicit finite set of height 1 primes depending on the ring and the representation.

Brunault, Francois:

Explicit p-adic regulators for K_2 of elliptic curves

We will explain how to use the local part of Kato's Euler system and the Perrin-Riou exponential map to get an explicit formula for the$p$-adic regulator of specific elements in K_2 of the modular curve $X(N)$. From this we deduce a similar formula for the modular curves $X_1(N)$ and $X_0(N)$. For some elliptic curves over $\mathbb{Q}$, this construction yields explicit elements in K_2 whose p-adic regulators are conjecturally non-zero.

Ciperiani, Mirela:

Divisibility of Heegner points on $\mathbb{Z}_p$-extensions

Let E be an elliptic curve over $\mathbb{Q}$, of analytic rank greater than 1, and p a prime of good ordinary reduction. Consider the Heegner points which lie on E over the different layers of the anticyclotomic $\mathbb{Z}_p$- extension of an imaginary quadratic extension K. Since the analytic rank of $E/\mathbb{Q}$ is greater than 1 the trace of a Heegner point down to K equals zero. We will discuss what this implies about the divisibility of the Heegner points by elements of the relevant Iwasawa algebra.

Fouquet, Olivier :

Dihedral Iwasawa theory for nearly ordinary modular forms

Using the formalism of Selmer complexes and an Euler system coming from CM points, we formulate main conjectures for deformations of modular Galois representations. Under some hypotheses on the structure of Hecke algebras, we prove part of these conjectures (divisibilities where equalities are expected).

Hara, Takashi :

Inductive construction of non-commutative p-adic zeta functions for totally real number fields

We will discuss how to construct the p-adic zeta functions for non-commutative pro-p extensions of totally real number fields. First we deal with the cases of exponent p as toy models, and then we will discuss general cases by using Mahesh Kakde's computation of Whitehead groups of Iwasawa algebras. We will also explain the relation between our strategy and the additive congruences presented by Jurgen Ritter and Alfred Weiss.

Hida, Haruzo :

Galois image and μ-invariant

We describe a way to exploit the vanishing of the μ-invariant of p-adic L-functions to determine the size of the image of modular Galois representations.

Greither, Cornelius :

Tate modules of Picard 1-motives and applications II

In continuation of Popescu's talk we will address the following points:

(1) Sketch proofs of the basic main result (projectivity of the Tate module of the relevant motive over the group ring) based on the Riemann-Hurwitz formula and other well established results in both relevant contexts (function fields and number fields.)

(2) Concrete calculations of class groups as Galois modules.

(3) As another illustration, we study the (degree zero) class group of a Fermat curve over a finite field as a Galois module.

(4) We show in detail how our machinery produces a very explicit 4-term sequence with projective middle terms, and discuss the relation to Tate sequences in the function field case. This leads to applications towards the Equivariant Tamagawa Number Conjecture. Similar applications are expected in the number field case.

(5) In conclusion, we will briefly (and very tentatively) mention non-commutative analogs of Fitting ideals.

Nickel, Andreas :

Non-commutative Fitting invariants and applications to Iwasawa theory

One can associate to each finitely presented module M over a commutative ring R an R-ideal $\mathrm{Fitt}_R(M)$ which is called the (zeroth) Fitting ideal of M over R and which is an important natural invariant of M. We generalize this notion to $\mathfrak{o}$-orders in separable algebras, where $\mathfrak{o}$ is a complete commutative noetherian local ring. As an application we reformulate the equivariant Iwasawa main conjecture (at least in the dimension 1 case) in terms of Fitting invariants. This can be used to prove parts of the equivariant Tamagawa number conjecture for an infinite class of (non-abelian) Galois CM-extensions.

Ochiai, Tadashi :

Towards construction of Iwasawa theory over Galois deformation spaces

I would like to discuss the plan to study Iwasawa theory over families of Galois deformations. Such a generalization of Iwasawa theory was proposed by Greenberg in the early 90's. I start by reporting my results in the case of nearly ordinary Hida deformations for $GL(2)$ over the rationals, which is the first example for such generalized Iwasawa theory. Then we will discuss the case for Hida deformations of the group of higher rank. If possible, I will also talk about the difficulties, the problems and the new ideas of this project.

Park, Jehoon :

On Teitelbaum type L-invariants of Hilbert modular forms attached to definite quaternions

We generalize Teitelbaum's work on the definition of L-invariant to Hilbert modular forms that arise from definite quaternion algebras over totally real fields by the Jacquet-Langlands correspondence. An exceptional zero conjecture for the p-adic L-functions of these Hilbert modular forms is proposed using this L-invariants. This is a joint work with Masataka Chida and Chung Pang Mok.

Pollack, Robert and Weston, Tom:

Fitting ideals of Selmer groups of modular forms I,II

In these talks, we will prove some cases of a conjecture of Mazur and Tate that the analytically defined Mazur-Tate element is in the Fitting ideal of the dual Selmer group of a weight two modular form. Generalizations of these statements to higher weight modular forms will be explored using the recent developments of the theory of p-adic local Langlands.

Popescu, Cristian :

Tate modules of Picard 1-motives and applications I

I will report on joint work with Greither on the Galois module structure of Tate modules of Picard 1-motives in positive characteristic and their Iwasawa theoretic analogues in characteristic 0. First, I will describe the construction of the relevant Iwasawa modules; second, I will state and comment on the

proof of an equivariant Main Conjecture for these Iwasawa modules (leaving the more relevant details of the proof for Greither's talk); finally, I will discuss applications of these results to refinements of the Brumer-Stark and Coates-Sinnott Conjectures, as well as refinements of the Rubin-Stark and Gross Conjectures.

Pottharst, Jonathan :

Iwasawa theory of motives at nonordinary primes

We present a generalization of Greenberg's theory of Iwasawa Selmer groups to nonordinary primes of motives, using Galois cohomology of families of (ϕ, Γ)-modules. Our Selmer modules are coherent analytic sheaves on the underlying p-adic analytic space of weight space. In the case of modular forms, Kato's Euler system gives one divisibility in a main conjecture.

Prasanna, Kartik :

Algebraic cycles and p-adic L-functions

I will discuss some applications of p-adic L-functions to the Bloch-Beilinson conjecture and its refined version involving coniveau. In particular, I will explain some applications of p-adic L-functions to constructing varieties over number fields with nontorsion Griffiths groups.

Joint w/ Bertolini and Darmon.

Ritter, Jürgen :

On the 'main conjecture' of equivariant Iwasawa theory

The talk sketches a proof of the 'main conjecture' of equivariant Iwasawa theory, up to its uniqueness statement. It is assumed that Iwasawa's μ-invariant vanishes. – This is joint work with A. Weiss.

Venjakob, Otmar :

A splitting for K_1 of Iwasawa algebras

Motivated by the theory of Coleman power series (reinterpreted via fields of norms by Fontaine) we construct a splitting of the natural map of K_1-groups arising from the mod p reduction map of the Iwasawa algebra of a pro-p Lie group. We also discuss the vanishing of SK_1 for such groups. This is joint work with P. Schneider.

Wuthrich, Chris :

Extending Kato's divisibility to elliptic curves with p-isogenies.

The Euler system argument may fail to give the correct upper bound when the image of the p-adic Galois representation is not large enough; like for elliptic curves $E/\mathbb{Q}$ which admit an isogeny of degree p. Nonetheless, one can prove Kato's divisibility for the main conjecture using his zeta elements if one takes care of the failure of their integrality. As a consequence one concludes that the p-adic L-function is integral.

Zerbes, Sarah :

Iwasawa theory for modular forms at supersingular primes

I will talk about joint work with Antonio Lei and David Loeffler. We define a family of Coleman maps for positive crystalline p-adic representations of the absolute Galois group of $\mathbb{Q}_p$ using the theory of Wach modules. Let f be a normalised new eigenform and p an odd prime at which$f$ is either ordinary or supersingular. By applying our theory to the p-adic representation associated to f, we define two Coleman maps and decompose the classical p-adic L-functions of f into linear combinations of two power series of bounded coefficients, generalising works of Pollack (in the case $a_p = 0$) and Sprung (when f corresponds to an elliptic curve over the rationals). Using ideas of Kobayashi for elliptic curves which are supersingular at p, we associate to each of these power series a Selmer group over the p-power cyclotomic extension of $\mathbb{Q}_p$ which we show to be cotorsion over the Iwasawa algebra. We formulate a 'main conjecture' and discuss its relation to Kato's main conjecture.