Galois representations and L-functions
Représentations galoisiennes et fonctions L
(Org: **Antonio Lei** (Laval) and/et **Giovanni Rosso** (Concordia))

REBECCA BELLOVIN, Glasgow
Modularity of trianguline Galois representations

The Fontaine-Mazur conjecture (proved by Kisin and Emerton) says that (under certain technical hypotheses) a Galois representation $\rho : \mathrm{Gal}_{\mathbf{Q}} \to \mathrm{GL}_2(\overline{\mathbf{Q}}_p)$ is modular if it is unramified outside finitely many places and de Rham at p. I will discuss an analogous modularity result for Galois representations $\rho : \mathrm{Gal}_{\mathbf{Q}} \to \mathrm{GL}_2(L)$ which are unramified away from p and trianguline at p, when L is instead a non-archimedean local field of characteristic $p > 0$. More precisely, I will show that such Galois representations are attached to points on the extended eigencurve.

ASHAY BURUNGALE, Caltech
An even parity instance of the Goldfeld conjecture

In 1979 D. Goldfeld conjectures 50% of the quadratic twists of an elliptic curve over the rationals have analytic rank 0. We present the first instance: the congruent number elliptic curves (joint with Y. Tian).

JUAN ESTEBAN RODRIGUEZ CAMARGO, ENS de Lyon
Hodge-Tate decompositions for Siegel varieties

In this talk we will sketch a new proof of the Hodge-Tate decompositions for the proétale cohomology of Siegel varieties. The idea behind is to apply the BGG method of Faltings via the Hodge-Tate period map and the infinite level Siegel variety.

ANTONIO CAUCHI, Concordia University
Quaternionic diagonal cycles and explicit reciprocity laws

In the early nineties, Kato's Euler system of Beilinson elements and the theory of Heegner points revolutionised the arithmetic of (modular) elliptic curves over the rationals. For instance, the former led Kato to proving instances of the Birch and Swinnerton-Dyer conjecture for twists of elliptic curves over Q by finite order characters. While the theory of Heegner points was generalised to elliptic curves E/F defined over totally real number fields, Kato's result hasn't found its natural extension to twists of E/F yet.

More recently, the theory of diagonal cycles, arising from the work and collective effort of Bertolini, Darmon, Rotger, Seveso, and Venerucci, has proven to be a fertile environment for proving new instances of the Birch and Swinnerton-Dyer conjecture for elliptic curves over the rationals. The aim of this talk is to discuss joint work in progress with Daniel Barrera, Santiago Molina, and Victor Rotger on the generalisation of the theory of diagonal cycles to quaternionic Shimura curves over totally real number fields F and its application to extending Kato's result for twists of elliptic curves E/F by Hecke characters of F of finite order.

MARIA FOX, University of Oregon
Supersingular Loci of Unitary Shimura Varieties

Unitary Shimura varieties are moduli spaces of abelian varieties with an action of a quadratic imaginary field. The supersingular locus of a unitary Shimura variety parametrizes supersingular abelian varieties with such an action. In some cases, this supersingular locus has a very particular structure: each irreducible component is a Deligne-Lusztig variety, and the intersection combinatorics are controlled by a Bruhat-Tits building. We'll consider two examples like this, and then observe that this does not hold in general. (This talk concerns joint work with Naoki Imai.)

GIADA GROSSI, Université Sorbonne Paris Nord
p-BSD and Iwasawa theory at Eisenstein primes

I will survey on recent developments towards the p-part of the Birch and Swinnerton-Dyer conjecture for Eisenstein primes. For rational elliptic curves of rank one, this was studied in joint work with F. Castella, J. Lee and C. Skinner and it is work in progress with F. Castella and C. Skinner in the case of rank zero, refining (and re-proving) the result of Greenberg–Vatsal.

SEAN HOWE, University of Utah
Slope classicality and completed cohomology

We use the completed cohomology classes attached to overconvergent modular forms to give a new proof of Coleman's slope classicality criterion for overconvergent modular forms and for the compactly supported cohomology groups of Boxer-Pilloni's higher Coleman theory for modular curves. We will also discuss the role played by these lattter compactly supported cohomology groups in Pan's Hodge-Tate decomposition for highest weight locally analytic vectors in completed cohomology.

CHI-YUN HSU, UCLA
Overconvergent generalized eigenforms associated to a critical CM form

Let f be the critical p-stabilization of a modular form with complex multiplication. It is known that the generalized Hecke eigenspace of overconvergent forms containing f has dimension greater than one. This has implications that the eigencurve is ramified at f with respect to the weight map, the p-adic L-function vanishes at f, and there is a special element in the Selmer group of the Galois representation associated to f. We will describe the relations among these phenomena. For example, if f' is a generalized eigenform not a multiple of f, then the Fourier coefficients of f' can be described by the Selmer element mentioned above.

JAMES NEWTON, University of Oxford
Killing ramification and a relative modularity lifting theorem.

This talk is about part of our proof with Thorne of the automorphy of symmetric powers of cuspidal Hecke eigenforms. The final phase in the proof is an induction on the number of supercuspidal primes for the eigenform. This is modelled on Khare and Wintenberger's proof of Serre's conjecture. I'll explain how we carry out this argument using a new modularity lifting theorem.

ANWESH RAY, University of British Columbia, Vancouver
Iwasawa theory and congruences for the symmetric square of a modular form

I will report on joint work with R. Sujatha and V. Vatsal. Two p-ordinary Hecke-eigenforms are are congruent at a prime $\varpi | p$ if all but finitely many of their Fourier coefficients are congruent modulo ϖ. R. Greenberg and V. Vatsal showed in 2000 that the Iwasawa-invariants of congruent modular forms are related. This involves studying the behavior of Selmer groups and p-adic L-functions with respect to congruences. We generalize these results to symmetric square representations.

In this setting, the normalized L-values for $sym^2(f)$ can be expressed in terms of the Petersson inner product of f with a nearly holomorphic function. The Petersson inner product is modified and related to an abstractly defined algebraic pairing due to Hida, and the two pairing are related up to a "canonical period". As a result, it is shown that the p-adic L-function for the symmetric-square exhibit congruences, and this has consequences for analytic Iwasawa invariants.

OSCAR RIVERO, University of Warwick
ARTIN FORMALISM AND EULER SYSTEMS

A useful source of analogies in the study of Euler systems is based on considering situations where one cusp form degenerates to an Eisenstein series. In this talk, I will discuss two different approaches to this question. The first one relies on the study of congruences between Euler systems when one cusp form is congruent to an Eisenstein series, which has been partially studied in a joint work with Victor Rotger. The second one considers Coleman families passing through a critical p-stabilization of an Eisenstein series and allows us to recover, for instance, Beilinson–Flach classes beginning with diagonal cycles. This last part is a joint work in progress with David Loeffler, that I will discuss in different scenarios, emphasizing possible applications.

ROB ROCKWOOD, University of Warwick
Plus/Minus p-adic L-functions for GL(2n)

Let f be a cuspidal newform with $a_p = 0$. Pollack's theory of plus/minus p-adic L-functions replaces the unbounded p-adic L-function L_p of f with two bounded ones L_p^+, L_p^-, between them interpolating the critical L-values of f.

We give an overview of plus/minus theory and its generalisation to automorphic representations of GL(2n), along with some neat applications.