One day workshop on modular forms, Euler systems and p-adic L-functions

Cardedeu (Barcelona)

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Schedule

- 10:00-11:00 Francesca Gatti (UPC) and Xavier Guitart (UB), *The elliptic Stark conjecture in higher weight.*

  Abstract : Consider the triple product p-adic L-function $L_p^g(\mathbf{f},\mathbf{g},\mathbf{h})$ attached to three Hida families $\mathbf{f},\mathbf{g},\mathbf{h}$; it interpolates the classical values $L(f_k,g_\ell,h_m,\frac{k+\ell+m-2}{2})$ for weights (k,ℓ,m) such that $\ell \geq k+m$. Take a triple of weight (k,ℓ,m) with $k \geq \ell+m$ and $\ell,m \geq 2$. When $L(f_k,g_\ell,h_m,s)$ vanishes at $s=c:=\frac{k+\ell+m-2}{2}$ with order 2, our conjecture relates the value of $L_p^g(\mathbf{f},\mathbf{g},\mathbf{h})(k,\ell,m)$ to a regulator attached to cycles in the Chow group $\mathrm{CH}^c(W_{k-2}\times W_{\ell-2}\times W_{m-2})$ of the product of three Kuga–Sato varieties. This conjecture is an analogous in higher weights of the elliptic Stark conjecture of H. Darmon, A. Lauder and V. Rotger, in which the weights are $(k,\ell,m)=(2,1,1)$.

- 11:15-12:15 Oscar Rivero (UPC), *The Euler system of Beilinso-Flach elements.*

  Abstract : In this talk, we will revisit the construction of the three variable Euler system of Beilinson-Flach elements, following the ideas of Lei, Loeffler, Kings and Zerbes. Then, we will explain different applications that we have been studying: first of all, we will see how they supply theoretical evidence for the Elliptic Stark conjecture in the case of units in

number fields; then, we will see that they can be also used for deriving results around the Darmon-Dasgupta conjecture, using for that previous results of Park. At the end, we study the phenomenon of exceptional zeros in the setting of Beilinson-Flach elements, and how this leads us to the construction of what we will call derived Euler system.

- 12:30-13:30 Santi Molina and Daniel Barrera (UPC), *Triple product p-adic L-functions over totally real fields.*

  Abstract: We give a different construction of the Eigenvariety over totally real fields using the geometry of Shimura curves, and we apply recent work due to Andreatta and Iovitta to construct triple product p-adic L-functions for families of Hilbert modular forms. This is the first step of a program that aims to generalize the work by Darmon and Rotger in order prove certain rank zero cases of the Birch and Swinnerton-Dyer conjecture over totally real fields.

- 13:30-15:00 Coffee break-Lunch[1]

- 15:15-16:15 Valentin Hernandez (UPC), *Families of PEL automorphic forms and arithmetic applications.*

  Abstract : In this talk I will start by explaining the main ideas used to construct families of modular forms and some arithmetic applications of these constructions. Then, I will explain how this generalise to automorphic forms for higher dimensional PEL Shimura varieties, try to explain what are the remaining difficulties, and give a few examples of applications we can expect.

- 16:30-17:30 Marc Masdeu (UAB), *Computing Bianchi p-adic L-functions, and a conjecture of Coates–Sujatha.*

  Abstract: I will explain a project that we are set to start with Chris Williams and Bharathwaj Palvannan, whose goal is to gather numerical evidence supporting a conjecture of Coates–Sujatha. This conjecture predicts that a certain fine Selmer group is pseudo-null with respect to a certain Iwasawa algebra, and this can be tested by computing various p-adic L-functions constructed by D. Loeffler and X. Wan. The goal of the talk will be to make precise the last sentence.

- 17:45-18:45 Victor Rotger (UPC), *Darmon's conjecture on the rationality of Stark-Heegner points over real quadratic fields.*

  Abstract : Stark-Heegner points are conjectural substitutes for Heegner points when the imaginary quadratic field of the theory of complex multiplication is replaced by a real quadratic field K. They are constructed analytically as local points on elliptic curves with multiplicative reduction

[1]Lunch and dinner will be covered by ERC's Consolidator Grant BSD (GA: 682152) held by Victor Rotger at UPC

at a prime p that remains inert in K, but are conjectured to be rational over ring class fields of K and to satisfy a Shimura reciprocity law describing the action of G_K on them.

The main conjectures of Darmon predict that any linear combination of Stark-Heegner points weighted by the values of a ring class character ψ of K should belong to the corresponding piece of the Mordell-Weil group over the associated ring class field, and should be non-trivial when $L'(E/K, \psi, 1) \neq 0$. The result I will present in this lecture is joint work with Henri Darmon, where we show that such linear combinations arise from global classes in the idoneous pro-p Selmer group, and are non-trivial when the first derivative of a weight-variable p-adic L-function $\mathcal{L}_p(\mathbf{f}/K, \psi)$ associated to $(E/K, \psi)$ does not vanish at the idoneous point.