Regulators, L-values and p-adic cohomologies

London–Paris Number Theory seminar, 12-13th November 2026

Thursday 12th November

14.00 Rob Rockwood (King's College):

On the p-part of BSD at Eisenstein primes over abelian extensions of $\mathbb{Q}$

Let E be an elliptic curve over $\mathbb{Q}$, and let $K/\mathbb{Q}$ be an abelian extension. I will discuss joint work with Dominik Bullach on the Birch–Swinnerton-Dyer conjecture for E over K in analytic rank zero. In particular, assuming $L(E/K, 1)$ non-vanishing, when K is totally real and $p > 3$ is a prime such that $E[p]$ is reducible and satisfies a certain parity condition, we obtain the p-part of the BSD formula for E over K with only very mild restrictions on the reduction type of E.

15.00 *Coffee break*

15.30 Ting-Han Huang (Sorbonne Paris Nord):

On the third p-adic symmetric square L-function and its functional equation

In this talk, we aim to construct a p-adic symmetric square L-function associated with the $\alpha\beta$-submodule in the symmetric square of a modular form, whose existence is predicted by a conjecture of Coates and Perrin-Riou.

Unlike the other ones, our p-adic L-function does not vary in families of classical modular forms.

Such a fact poses some difficulty, especially in studying the functional equation. We will show how we resolve this problem by using the pairing between Iwasawa cohomology groups and big logarithm maps of Perrin-Riou.

16.45 Chris Lazda (Exeter):

Duality theorems for syntomic cohomology over local and global function fields

Let k be a local field of characteristic $p > 0$. Using Dodd's theory of F-gauges, we define syntomic cohomology with coefficients over k, and prove that it satisfies local Tate duality. We also show that syntomic cohomology over the ring of integers of k, again with coefficients, is Lagrangian with respect to the duality pairing. Time permitting, we will explain how, for $p > 2$, these results recover Shatz's duality and Milne's orthogonality results for the cohomology of finite flat group schemes of p-power order over k. We will also briefly explain global analogues of these results, showing that Poitou-Tate duality holds in syntomic cohomology.

Friday 13th November

10.00 David Lilienfeldt (Ecole Polytechnique)

Elements in K_4 and regulator maps of Fermat curves

Beilinson's conjectures predict that special values of L-functions of varieties are given, up to rational factors, by regulators of elements in algebraic K-theory. In this talk, I will present a uniform construction of non-trivial elements in K_4 of the Fermat curves of degree N using polylogarithmic complexes. Their regulators have explicit formulas involving Zagier's trilogarithm and hypergeometric functions, and they grow like $3/2\zeta(s)N^2$. When $N = 3, 4, 6$, I will provide numerical verifications of Beilinson's conjecture for L-values at $s = 3$. This is joint work with François Brunault and Yusuke Nemoto.

11.30 Sally Gilles (Besançon)

$\mathbb{G}_m$-cohomology of p-adic Stein spaces

In this talk I will explain a computation that we did with Damien Junger, in which we determined the étale cohomology with $\mathbb{G}_m$ coefficients of some p-adic analytic spaces. One difficulty is that rigid analytic spaces do not have enough points and it is not possible to deduce the global behavior of $\mathbb{G}_m$ from the one of its stalks. Instead we consider the quotient $\mathbb{G}_m/U$ of $\mathbb{G}_m$ by the group of principal units U. The cohomology of this quotient is then computed using Kummer exact sequence, whereas the cohomology of U can be computed by passing to the pro-étale site, via p-adic methods.

13.30 Joaquìn Rodrigues (Marseille)

Exponential maps and Iwasawa Theory

Perrin-Riou's exponential and logarithm maps are important maps in Iwasawa Theory, notably for the construction of p-adic L-functions associated with Euler systems. We will explain how one can reinterpret and extend these constructions using the Fargues-Fontaine curve and the theory of locally analytic representations. This is a joint work with Gautier Ponsinet.