

## Course announcement - Math 201, Winter 2010

### Special Values of L-functions

The course will be based on my recent joint work with Greither leading to the proof of a Galois-equivariant Main Conjecture in Iwasawa Theory in both characteristics 0 and  $p$  and its consequences.

Our results on the Equivariant Main Conjecture in characteristics  $p$  and 0 are integral refinements of results of Deligne and Tate on  $\ell$ -adic realizations of Picard 1-motives defined over finite fields (1980s) and results of Wiles in classical Iwasawa Theory of number fields (1990), respectively. These refinements relate a special value of a Galois-equivariant  $p$ -adic L-function to the Fitting ideals over certain profinite group rings of a new class of Iwasawa modules. By Iwasawa descent and under certain reasonable hypotheses, our results lead to proofs of various classical conjectures on special values of (Artin) global L-functions, e.g. the Brumer-Stark Conjecture, the Coates-Sinnott Conjecture, the Rubin-Stark Conjecture etc.

The main goal of the course is to familiarize the audience with the statements of the conjectures, the objects and techniques involved in the proofs, sketch some of the more accessible proofs and discuss possible further applications (e.g. to the theory of Tate sequences and the Equivariant Tamagawa Number Conjecture of Bloch-Kato.) I am planning on spending a considerable amount of time trying to build the geometric intuition behind the main conjecture (stemming from our work on Picard 1-motives associated to characteristic  $p$  global fields, i.e. function fields.) Once the audience becomes more or less conversant in the geometric language, I will move into the more treacherous world of characteristic 0 global fields (number fields) and explain how the geometry (or perhaps only its  $\ell$ -adic realizations!) can be transferred there as well. It will be fun!

Prerequisites: Algebraic Number Theory, Curiosity and an Open Mind.

Bibliography: My joint papers with Greither will be made available to the audience.

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