HUMBOLDT-UNIVERSITÄT ZU BERLIN
Mathematisch-Naturwissenschaftliche Fakultät II
Institut für Mathematik

Forschungsseminar Algebra und Zahlentheorie
Prof. E. Große-Klönne / Prof. T. Schmidt

Wintersemester 2013/14

Vorträge im Dezember 2013/Januar 2014

Minikurs von **Prof. Kazim Buyukboduk, Koc Univ. Istanbul**

Titel: Beilinson-Kato elements and the p-adic BSD conjecture of Mazur-Tate-Teitelbaum

Abstract: In order to formulate a *p*-adic Birch and Swinnerton conjecture(BSD for short) for an elliptic curve E, Mazur, Tate and Teitelbaum (MTT) constructed a *p*-adic *L*-function attached to *E*. To understand its compatibility with the usual BSD, one needs to compare the order of vanishing of the *p*-adic *L*-function at *s=1* to that of the Hasse-Weil *L*-function (where the latter is called the analytic rank of *E*). When *E* has split multiplicative reduction mod *p*, MTT observed that the *p*-adic *L*-function always vanishes at *s=1* and they conjectured that its order of zero is exactly one more than the analytic rank of *E*. In 1992, Greenberg and Stevens proved this conjecture when the analytic rank is zero.

In the first two lectures of this talk, I will explain a proof of the MTT conjecture when the analytic rank is one. The main ingredients for the proof are the Beilinson-Kato elements in the K_2 of modular curves and a Gross-Zagier-style formula we prove for the *p*-adic height of the Beilinson-Kato elements. In the last part of the talk, I will discuss an extension (in a joint work with D. Benois) of this result to the case of a modular form f of weight greater than *2*. The main difficulty in this case lies in the fact the Galois representation *V* attached to f by Deligne, in the presence of "extra zeros", is no longer *p*-ordinary. This difficulty is circumvented relying on the fact that the (local Galois representation) *V* admits a triangulation over the Robba ring (thence it is ***ordinary*** in the level of the associated $(\varphi\text{-}\Gamma)$-modules).

11.12.2013   **Lecture 1**
Basics: Elliptic curves, BSD, *p*-adic BSD and Iwasawa theory, Kato's Euler system and applications.

18.12.2013   **Lecture 2**
Nekovar's Selmer complexes and *p*-adic heights, a (higher) *p*-adic Gross-Zagier formula and the conjecture of Mazur-Tate-Teitelbaum.

22.01.2014   **Lecture 3**
Galois representations attached to modular forms, triangulations and the MTT conjecture for modular forms of higher weight (joint work with Denis Benois).

     Prof. E. Große-Klönne   Prof. T. Schmidt

Alle Interessenten sind herzlich eingeladen.

Die Vorträge finden Rudower Chaussee 25, 12489 Berlin, Raum 2.009, statt. Zeit: 11-13 Uhr.