

Opening Session of the International Conference

Modular forms, p -adic L-functions and Selmer groups
July 8th, 2013 - FMI, room 325, University of Sofia

8:30 Registration*

9:20 Welcome address by Emil Horozov (University of Sofia)

9:30 Christopher Skinner (Princeton University)

p -adic numbers and their uses in number theory.

Abstract: This talk is meant for a general mathematical audience. It will introduce the p -adic numbers and describe some of the ways they have been used to resolve a variety of problems in number theory, including - as time permits - describing the zero set of a recursion sequence, understanding rational points on curves, proving modularity of elliptic curves, and studying special values of L-functions.

10:30 Coffee break*

11:00 Haruzo Hida (University of California Los Angeles)

Arithmetic of Weil numbers and Hecke fields.

Abstract: Analyzing prime factorization of Weil numbers in the union of algebraic extensions with bounded degree of the cyclotomic field K of all p -power roots of unity, we show that there are only finitely many Weil p -numbers of a given weight for a prime p (upto roots of unity). Applying this fact to Hecke eigenvalues of cusp forms in a p -adic analytic families of cusp forms of p -power level, we show that the field generated by the eigenvalues over the family has unbounded degree over K .

12:15 Lunch

14:00 Gebhard Boeckle (University Heidelberg)

Images of p -adic Galois representations.

Abstract : For an elliptic curve E without complex multiplication over a number field K , in 1972 Serre proved (1) that the image of the absolute Galois group of K when acting on the ℓ -adic Tate-module of E is an open subgroup of $GL_2(\mathbb{Z}_\ell)$, and (2) that the images for different ℓ are "almost independent" by proving an adelic openness theorem. Already for abelian varieties over \mathbb{Q} the generalization of (1) is rather difficult and still open.

Recently, a variant of (2), the question of almost independence has been settled in great generality, again starting with work of Serre. Here one considers for a scheme X of finite type over a field K the family of ℓ -adic cohomology groups $V_\ell = H_c^q(X, \mathbb{Q}_\ell)$ as finite dimensional representations of the absolute Galois group G_K of K when ℓ varies over the rational primes. Various independence results in this setting are due to Serre, Gajda-Petersen, and Gajda-Petersen and myself.

In the talk I shall give a general introduction to the theme of images of Galois representations of certain geometric objects and, in the second half, focus on the results with Gajda and Petersen.

15:00 Coffee break*

*the refreshments will be served next to the lecture room 325.