5TH ISRAELI ALGEBRA AND NUMBER THEORY DAY

Peter Schneider (Münster)

Iwasawa cohomology for Lubin-Tate (φ, Γ)-modules

First I will recall what Lubin-Tate (φ, Γ)-modules are and how they are equivalent to the p-adic Galois representations of a finite extension L of $\mathbb{Q}_p$. Then I will describe how the Iwasawa cohomology of such a Galois representation can be computed in terms of the corresponding (φ, Γ)-module. This is joint work with O. Venjakob. If time permits I will discuss an alternative approach based upon the character variety of the additive group of the ring of integers of L.

Stefano Morra (Montpellier)

Generalized Serre conjectures, local-global compatibility, and the p-adic local Langlands program

We discuss the generalization of the weight part of Serre's conjecture for GL_n and how these conjectures are related to the mod p and p-adic local Langlands program.

Let $F/\mathbb{Q}$ be a number field where p is unramified and $r : \mathrm{Gal}(\overline{F}/F) \to \mathrm{GL}_n(\overline{\mathbb{F}}_p)$ be a continuous, totally odd Galois representation. When $n = 2$ and $F = \mathbb{Q}$, J.-P. Serre conjectured that r should indeed be modular, the minimal weights of the modular forms being predicted by the local behavior of r at the decomposition group at p.

Since then, the progress in understanding the cohomology of arithmetic manifolds showed that the strong form of Serre's modularity conjecture is indeed a description of the $\mathrm{GL}_n(\overline{\mathbb{F}}_p)$-action on Hecke isotypical parts in the cohomology of Shimura varieties with principal level at p, in terms of the inertial behavior of r at places above p.

This can be interpreted as an avatar of an hypothetical *p-adic local Langlands correspondence* and its local-global compatibility in the cohmology of Shimura varieties.

In this talk we will discuss recent progress on the weight part of Serre's modularity conjectures, and generalizations for $U(n)$ arithmetic manifolds, using modularity lifting techniques, a deep understanding of deformation spaces beyond the Barsotti-Tate case, and combinatorial methods in modular representation theory.

This is joint work with Dan Le, Viet-Bao Le Hung, and Brandon Levin.

François Legrand (Technion)

On the Grunwald problem for regular Galois groups over $\mathbb{Q}$

Let G be a finite group. Given a finite set S of prime numbers and, for each $p \in S$, a finite Galois extension $F_p/\mathbb{Q}_p$ with Galois group embedding into G, the Grunwald problem asks whether there exists a finite Galois extension of $\mathbb{Q}$ with Galois group G which approximates the local extensions $F_p/\mathbb{Q}_p$ $(p \in S)$. We investigate to what extent the set of specializations of a given finite regular Galois extension of $\mathbb{Q}(T)$ with Galois group G can provide answers to this question. As an application, we show that, for many finite groups G, the set of specializations of a given finite regular Galois extension of $\mathbb{Q}(T)$ with Galois group G does not cover all the realizations of G over $\mathbb{Q}$. This is a joint work with Joachim König and Danny Neftin.

Gabor Wiese (Luxembourg)

On Galois representations of weight one

Modular forms of weight one play a special role, especially those that are geometrically defined over a finite field of characteristic p. For instance, in general they cannot be obtained as reductions from weight one forms in characteristic zero. Another property is that if the level is prime to p, then the attached mod p Galois representation is unramified at p. It is known that this property characterises weight one forms (if $p > 2$). In this talk, I will present the approach chosen in joint work with Mladen Dimitrov to prove the unramifiedness above p in the case of Hilbert modular forms of parallel weight one over finite fields of characteristic p and level prime to p. The approach is based on Hecke theory and exhibits an interesting behaviour of the Galois representation into an appropriate higher weight integral Hecke algebra.