Titles and abstracts

Monday

14h30 — Andrea Pulita

The convergence Newton Polygon of a p-adic differential equation

Following an original idea of Dwork, the radii of convergence of the Taylor solutions at a point x of a p-adic differential equation encode numerical invariants of the equation. Varying the point x it is possible to construct some functions whose behavior is the major tool in the classification of p-adic differential equations. We prove that these function have a certain finiteness property: they are controlled by a finite graph. This means that the numerical invariants that one can extract from their variation are finite in number. The language we use is that of Berkovich spaces. An important theoretical point in this picture have been the intrinsic definition of the radii obtained recently by F. Baldassarri 2010 together with the continuity of the smallest radius.

15h45 — Agnès David

Computing multiplicities in the Breuil-Mzard Conjecture

Let $\overline{\rho}$ be a 2-dimensional, modulo p, continuous representation of the absolute Galois group of a finite unramified extension of $\mathbb{Q}_p$.
The Breuil–Mézard Conjecture describes geometric properties of potentially semi-stable deformation rings of $\overline{\rho}$ in terms of representation theoretical data and some integers, called the modular multiplicities.
I will present a method and an algorithm to compute these modular multiplicities. Our first results for fields of small degree indicate new geometric phenomena.
This is a work in progress with X. Caruso and A. Mézard.

17h00 — Sarah Zerbes

Wach modules and critical slope p-adic L-functions

There are two constructions of a critical slope p-adic L-function attached to an ordinary modular form: one construction using Kato's Euler system, and one construction due to Pollack and Stevens using overconvergent modular symbols. It is conjectured that these two constructions agree. We use the theory of Wach modules to study Kato's critical slope p-adic L-function; more precisely, we show that it may be decomposed as a sum of two bounded measures multiplied by explicit distributions depending only on the local properties of the modular form at p. We use this decomposition to prove results on the zeros of the p-adic L-function, and we show that our results match the behaviour observed in examples calculated by Pollack and Stevens for their critical slope p-adic L-function.

Tuesday

14h30 — Gabor Wiese

Questions on Galois representations modulo prime powers

The aims of this talk are twofold. On the one hand I will report on some recent work in collaboration with Kiming, Chen, and Tsaknias on modular forms and modular Galois representations modulo prime powers. On the other hand I will try to motivate this study by raising some natural questions and by presenting computational applications.
More precisely, with Kiming and Chen we introduce three in general distinct notions of modular eigenforms modulo p^n, and hence three corresponding types of modularity modulo p^n, where p is a prime number. Motivated by the wish to computationally study p-adic modular Galois representations by approximating them modulo p^n, one is naturally led to questions about optimal levels and weights. These questions, in particular that of optimal weights, are appearing to be quite hard in general. A natural weaker question concerns the existence of weight bounds for modular Galois representations mod p^n of bounded ramification away from p. This would be settled in general if one had an affirmative answer to a question of Buzzard concerning p-adic coefficient fields; so far, we are only able to prove finiteness by bounding the slope of the modular forms.

15h45 — Sandra Rozensztajn

Asymptotic modular multiplicities for GL_2

17h00 — Wansu Kim

Rapoport-Zink spaces of Hodge type, and application to Shimura varieties

Assume that $p > 2$. We construct an "Hodge-type analogue" of Rapoport-Zink spaces for unramified reductive groups over $\mathbb{Q}_p$ as moduli spaces of p-divisible groups with some "crystalline Tate tensors". We use Artin's representability criterion for algebraic spaces, and the key step is to show a suitable moduli interpretation for the deformation space of p-divisible groups with Tate tensors constructed by Faltings.
Combined with the Langlands-Rapoport conjecture for Hodge-type Shimura varieties (announced by Vasiu and Kisin independently), one can obtain a moduli interpretation of the p-adic completion of the integral canonical model of Hodge-type Shimura varieties, and a "p-adic uniformization" result.

Wednesday

9h00 — Lenny Taelman

Arithmetic of Drinfeld modules

Drinfeld modules are analogues over function fields of objects such as the multiplicative group and elliptic curves over number fields. This talk will be partially an introduction to the theory of Drinfeld modules, and partially a survey of some recent results on their arithmetic: finiteness theorems (la Mordell-Weil and Tate-Shafarevich), special L-values, and the subtle arithmetic encoded by them.

10h15 — David Savitt

Lattices in the cohomology of Shimura curves

I will discuss joint work with Matthew Emerton and Toby Gee, in which we relate the geometry of tamely potentially Barsotti-Tate deformation rings for two-dimensional Galois representations to the integral structure of the cohomology of Shimura curves. As a consequence, we establish some conjectures of Breuil regarding this integral structure.

11h30 — Daniel Caro

Theory of weights in p-adic cohomology

Let k be a finite field of characteristic $p > 0$. We construct a theory of weights for overholonomic complexes of arithmetic D-modules with Frobenius structure on varieties over k. The notion of weight behave like Deligne's one in the ℓ-adic framework: first, the six operations preserve weights, and secondly, the intermediate extension of an immersion preserves pure complexes and weights.

Thursday

14h30 — Gebhard Boeckle

Irreducibility of local versal deformation rings in the (p, p)-case

Let r be a mod p Galois representation of the absolute Galois group of a p-adic local field. The p-adic Galois representations that have r as a reduction are precisely the closed points of the generic fiber X_r of the local versal deformation space of r. The talk addresses the question whether the subspace X_r^a of X_r of fixed given determinant a is irreducible. For $p > 2$ and 2-dimensional representations we indicate a proof. In light of recent work of Chenevier, Colmez, Kisin and Nakamura this implies that in this case benign crystalline points are dense in X_r. In the talk we also introduce a strategy to resolve the question for (certain) representations of arbitrary dimension. This is joint with the PhD student A.-K. Juschka.

15h45 — Nathalie Wach

Interprtation cristalline de l'isomorphisme de Deligne-Illusie dans le cas des courbes et applications

Pour une courbe X_0 projective et lisse sur un corps fini de caractéristique $p(\neq 2)$, on sait que le module $H^1_{DR}(X_0)$ est un φ-module filtré admissible et qu'il existe un morphisme semi-linéaire $gr(H^1_{DR}(X_0)) \to H^1_{DR}(X_0)$ bijectif. Une interprétation cristalline de l'application de Deligne-Illusie $\mathcal{O}_{X'_0} \oplus \Omega^1_{X'_0}[-1] \to {}_{\tau\leq 1}F_*\Omega_{X_0}$ sera présentée, qui fournit une méthode de calcul de ce morphisme.
Suivront ensuite des calculs explicites dans le cas des courbes hyperelliptiques et de la courbe de Drinfeld.

17h00 — Lassina Dembélé

To be annonced