



Institut Galilée, Université de Paris 13  
Laboratoire Analyse Géométrie Algèbre,  
Salle B407

**Jeudi 5 Mars**

*9.30–10.00 : Caffè !*

*10.00–11.00 : James Newton (King's College London)*

**Symmetric power functoriality for modular forms**

I will discuss some joint work with Jack Thorne on the symmetric power lifting for modular forms. We prove the existence of all symmetric power lifts for many cuspidal Hecke eigenforms (for example, those of square-free level).

*11.15–12.15 : Louis Garcia (University College London)*

**Eisenstein cohomology and transgressions of the Euler class**

I will discuss work in progress giving a new construction of Eisenstein classes on  $GL(n)$  first defined by Nori and Sczech, based on results of Bismut and Cheeger providing canonical transgressions of Euler forms. Our method realises these Eisenstein classes as regularised theta lifts for the dual pair  $(GL(1), GL(n))$  and admits a natural extension to the pair  $(GL(r), GL(n))$  for  $r > 1$ . Joint work with Nicolas Bergeron and Pierre Charollois.

*12.15–13.45 : Déjeuneur (Restaurant Administratif de l'Université de Paris 13)*

*14.00–15.00 : Jack Shotton (Durham)*

**Generic deformation rings in the  $\ell \neq p$  case**

In the “ $\ell \neq p$ ” case, we explain how to compute the local deformation rings at generic points on the moduli space of local Galois representations. These are formally smooth over a certain ring that turns out to be isomorphic to the endomorphism ring of a Gelfand–Graev representation. This leads to a simple local proof of the analogue of the Breuil–Mézard conjecture in the  $\ell \neq p$  case.

*15.00–15.30 : Ri-caffè per tutti!*

*15.30–16.30 : Elmar Grosse-Klönne (Berlin)*

**Duals of  $\psi$ -stable lattices in modular  $(\varphi, \Gamma)$ -modules**

Let  $F$  be a finite extension field of  $\mathbb{Q}_p$ , let  $k$  be a finite extension of its residue field. The category of representations of the absolute Galois group of  $F$  over  $k$  is equivalent with the category of  $(\varphi, \Gamma)$ -modules over  $k$ , i.e.  $k((t))$ -vector spaces  $\mathbf{D}$  with commuting semilinear actions by a Frobenius operator  $\varphi$  and by  $\Gamma = \mathcal{O}_F^\times$ . Out of  $\varphi$  one can construct another operator  $\psi$  on such a  $\mathbf{D}$  and then ask for  $\psi$ -stable lattices in  $\mathbf{D}$ . The  $k$ -duals of these are (torsion)  $k[[t]]$ -modules with, again, semilinear

actions by a Frobenius  $\varphi$  and by  $\Gamma$ . These modules admit of quite explicit and concrete ("finite") descriptions. One may hope that this gives an approach towards a rather explicit construction of (all, or many) extensions between given Galois representations over  $k$ . At least, it allows us to single out particular classes of Galois representations over  $k$ , and to define some "ramification invariants" for them.

## Vendredi 6 Mars

9.30–10.00 : *Caffè!*

10.00–11.00 : *Eugen Hellmann (Münster)*

### Locally algebraic vectors and the derived category of the Iwahori Hecke algebra

We discuss some newer (and some older) results on the geometry of the space of trianguline representations, and their implications on the locally analytic Jacquet module of a hypothetical  $p$ -adic local Langlands correspondence. This leads to a conjecture about the derived category of the Iwahori-Hecke algebra and the derived category of coherent sheaves on a stack of  $L$ -parameters. In turn, this conjecture has implications on the computation of locally algebraic vectors in the  $p$ -adic world.

11.15–12.15 : *Valentin Hernandez (Orsay)*

### The infinite fern in higher dimensions

If  $r$  denotes a modulo  $p$  global Galois representation of dimension 2 of  $G_{\mathbf{Q}}$ , and  $R$  denotes its deformation ring, then we can look at the so called infinite fern in the rigid fiber  $X$  of  $R$ , which is the image of deformation coming from  $p$ -adic modular forms. Under some hypothesis Gouvea and Mazur proved that this infinite fern is Zariski dense in  $X$ . In higher dimension  $n$ , we look at “polarized” representations  $r$  and corresponding deformation rings  $R$ . When  $n = 3$ , Chenevier proved an analogous density result (at least in a union of irreducible components) by understanding the geometry of the corresponding Eigenvariety together with the possible refinement of a given deformation of  $r$ . More recently, Hellman-Margarin-Schraen have proven a similar result in dimension  $n$ , under some restrictive Taylor-Wiles hypothesis, using the patching construction and a local model for the trianguline variety. In this talk I will explain how to use a strategy in between both proof to get a similar density result (in a union of irreducible components) for any  $n$  without assuming the Taylor-Wiles hypothesis nor using the patching construction. This is a joint work with Benjamin Schraen.

12.15–13.45 : *Déjeuneur (Restaurant Administratif de l'Université de Paris 13)*

14.00–15.00 : *Joaquin Rodrigues Jacinto (ENS-Lyon)*

### On higher regulators of Siegel varieties

In this talk, we will explain (joint work with Antonio Cauchi and Francesco Lemma) how to construct classes in the middle-degree plus one cohomology of a Siegel Shimura variety of almost any dimension and how to compute their image under Beilinson-Deligne’s higher regulator in terms of Rankin-Selberg type automorphic integrals. In the case of the Siegel sixfold, we relate the integral to a non-critical special value of a degree 8 spin  $L$ -function. If time permits, we will give an application to Iwasawa theory and the theory of Euler systems.

15:00–15:30 : *Thé du LAGA*

15.30–16.30 : *Jun Su (Cambridge)*

**Coherent cohomology of Shimura varieties and their automorphy**

With modular forms being the prototype, coherent cohomology groups of Shimura varieties (with the Hecke actions on them) are believed to be important bridges between Galois and automorphic representations. In the non-proper case these cohomology groups still have a nice definition thanks to the local torus bundle structures on Shimura varieties. In this talk we explain how these Hecke modules are computed by automorphic forms. We note that this work is based on the work of Borel and Franke in the Betti cohomology case.

*Les journées arithmétiques du LAGA sont soutenues par le LAGA, l'ANR CLap CLap, l'ANR COLOSS*