



MÉTHODES GÉOMÉTRIQUES EN THÉORIE DE REPRÉSENTATIONS ET FONCTORIALITÉS  
DE LANGLANDS

VENDREDI 3 JUIN 2022

AMPHITÉÂTRE C DU CAMPUS DE VILLETANEUSE

10.00–11.00 : *Karol Koziol (Université de Michigan)*

**Poincaré duality for modular representations of  $p$ -adic groups and Hecke algebras**

The mod- $p$  representations theory of  $p$ -adic reductive groups (such as  $\mathrm{GL}_2(\mathbf{Q}_p)$ ) is one of the foundations of the rapidly developing mod- $p$  local Langlands program. However, many constructions from the case of complex coefficients are quite poorly behaved in the mod- $p$  setting, and it becomes necessary to use derived functors. In this talk, I will describe how this situation looks for the functor of smooth duality on mod- $p$  representations, and discuss the construction of a Poincaré duality spectral sequence relating Kohlhaase’s functors of higher smooth duals with modules over the (pro- $p$ ) Iwahori–Hecke algebra.

11.15–12.15 : *Arno Kret (Université d’Amsterdam)*

**Galois representations for even general special orthogonal groups.**

I will discuss my recent work with Sug Woo Shin on the construction of Galois representations for even general special orthogonal groups. This work is based on a careful study of the cohomology of certain Shimura varieties associated to (forms of)  $\mathrm{GSO}_{2n}$ . See also [arxiv.org/abs/2010.08408](https://arxiv.org/abs/2010.08408).

12.15–13.30 : *Déjeuner*

13.30–14.30 : *Andrew Graham (Université de Paris-Saclay)*

**Functoriality of higher Coleman theory and  $p$ -adic  $L$ -functions in the unitary setting**

I will describe the construction of a  $p$ -adic analytic function interpolating unitary Friedberg–Jacquet periods, which are conjecturally related to central critical values of  $L$ -functions for cuspidal automorphic representations of unitary groups. The construction involves establishing functoriality of Boxer and Pilloni’s higher Coleman theory, and  $p$ -adically interpolating branching laws for a certain pair of unitary groups. The motivation for such a  $p$ -adic analytic function arises from the Bloch–Kato conjecture for twists of the associated Galois representation by anticyclotomic characters.

14.30–15.30 : *Hadi Hedayatzadeh (Institute for Research in Fundamental Sciences, Teheran)*

**Prismatic Windows with Additional Structures**

In this talk, I will present a joint work with O. Bültel and my student A. Partofard on prismatic windows with additional structures. I will start with a brief overview of the theory of displays, developed by Th. Zink, which is a generalization of Dieudonné theory. Displays play a crucial role in the study of Barsotti–Tate groups when the base is not a perfect field of positive characteristic. Zink has further developed the theory and introduced windows over frames. In another direction, in order to construct integral models of Shimura varieties that are not of Abelian type, O. Bültel defined and studied displays with additional structures, called  $(G, \mu)$ -displays. In this joint work, we combine these two inventions to define and study  $(G, \mu)$ -windows and show that under some mild conditions, the category of  $(G, \mu)$ -windows is equivalent to that of  $(G, \mu)$ -displays. Finally, in a joint project with Partofard, we develop the theory of prismatic windows, which is better

adapted to the setting of pefectoid geometry and is closely related to the stack of  $G$ -torsors over the Fargues–Fontaine curve.

*15.30–16.00 : Ri-caffè pour tous !*

*16.00–17.00 : Michael Rapoport (Université de Bonn)*

**Shtukas  $p$ -adiques et variétés de Shimura**

L'intérêt de construire des modèles entiers raisonnables de variétés de Shimura est reconnu depuis longtemps, et des progrès importants ont été effectués dans cette direction, les plus récents étant les travaux de Kisin–Pappas et Kisin–Zhou pour les variétés de Shimura de type de Hodge ou même de type abélien. La question de caractériser ces modèles entiers a aussi été considérée dans des cas particuliers. Je vais expliquer une telle caractérisation dans le cas général, basée sur le formalisme des shtukas  $p$ -adiques de Scholze. Travail en commun avec G. Pappas.

*Les journées arithmétiques du LAGA sont organisées par P. Boyer, F. Brumley, S. Morra, O. Wittenberg et sont soutenues par le LAGA, l'ANR COLOSS, l'IUF*