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FÉDÉRALE DE LAUSANNE

SEMINAR OF MATHEMATICS

WEDNESDAY March 25, 2015 at 11h15, lecture hall BI AO 448 (CIB)

Prof. **Olivier DUDAS** *(Université Paris Diderot)* will present a seminar entitled:

"Geometric methods in representation theory of finite groups of Lie type"

Abstract:

Finite groups of Lie type, also called finite reductive groups, are the finite analogs of complex Lie groups. Examples of such groups include the classical groups (finite linear groups $GL_n(q)$, orthogonal groups $SO_n(q)$, symplectic groups $Sp_{2n}(q)$) and the so-called exceptional groups.

Such finite groups have an underlying geometric structure, making geometric methods particularly adapted to study their symmetries and their representation theory. Following this observation, Deligne and Lusztig introduced in the 70's a family of algebraic varieties acted on by finite groups of Lie type. One goes from the world of algebraic varieties to the world of linear algebra by considering the cohomology of these varieties, which yields linear representations of finite groups of Lie type.

Although Deligne-Lusztig varieties are similar to flag varieties and Grassmannians, little is known about their cohomology and the representations they afford. Nevertheless, there is a lot of evidence that they encode most of the representation theory of finite groups of Lie type.

Starting with the example of $SL_2(q)$, one of the smallest non-trivial finite groups of Lie type, I will present conjectures and recent results illustrating how rich the cohomology of these varieties is, and what has yet to be discovered.

Lausanne, March 20 2015 / mg