
Algebraic Groups and Related Topics
Groupes algébriques et sujets reliés
(Org: **Philippe Gille** (CNRS-ENS, Paris) and/et **Zinovy Reichstein** (UBC))

PATRICK BROSANAN, University of British Columbia

Essential dimension and related topics

I will discuss joint work with Ramesh Sreekantan on the essential dimension of abelian varieties over number fields. Using results of Bogomolov, Florence and Serre, we showed that it is infinite for non-trivial abelian varieties.

VLADIMIR CHERNOUSOV, University of Alberta, Edmonton, AB, Canada

Almost-minimal nonuniform lattices of higher rank

We find minimal elements in three different (but essentially equivalent) partially ordered categories:

- (A) finite-volume, noncompact, complete, locally symmetric spaces of higher rank,
- (B) nonuniform, irreducible lattices in semisimple Lie groups of higher real rank,
- (C) isotropic, simple algebraic Q -groups of higher real rank.

The main interest is in categories (A) and (B), but the proof is carried out using the machinery of category (C).

AJNEET DHILLON, University of Western Ontario

On the essential dimension of the stack of bundles

I will discuss some joint work with Nicole Lemire on calculating the essential dimension of the moduli stack of SL_n -bundles over a smooth projective curve in characteristic zero. Our calculations rely heavily on the recent work of Brosnan–Reichstein–Vistoli. The other ingredient we need is the calculation of the Brauer group of the moduli space which is due to Balaji–Biswas–Gabber–Nagaraj. Both of these ingredients will be described in the talk.

MATHIEU FLORENCE, Paris VI

SKIP GARIBALDI, Emory University, Dept. of Mathematics & Computer Science, Atlanta, Georgia 30322, USA

Vanishing of trace forms in low characteristics

A finite-dimensional representation of an algebraic group G gives a trace symmetric bilinear form on the Lie algebra of G . We give a criterion in terms of root systems for this form to vanish. As a corollary, we show that a Lie algebra of type E_8 over a field of characteristic 5 does not have a so-called “quotient trace form”.

This is joint work with J-P. Serre.

JULIA GORDON, University of British Columbia
Harish-Chandra characters, orbital integrals, and motivic integration

I will describe a rather explicit parameter space for a class of Fourier transforms of orbital integrals in a p -adic Lie algebra. This allows to show that the values of Harish-Chandra characters of a class of supercuspidal representations of p -adic classical groups are controlled by a finite number of geometric objects defined over \mathbb{Q} .

This is joint work with Clifton Cunningham and Loren Spice.

NIKITA KARPENKO, UPMC Univ. Paris 6
Dimension essentielle de p -groupes finis

Dimension essentielle d'un objet algébrique est le nombre minimal de paramètres algébriquement indépendants qui sont nécessaires pour définir l'objet. Cette notion a été introduite par Buhler, Reichstein et Serre. Nous verrons des relations avec la géométrie algébrique cohomologie galoisienne, K -théorie algébrique et cycles algébriques en suivant des pas de la démonstration du résultat (en commun avec Merkurjev) qui dit que la dimension essentielle d'un p -groupe sur un corps contenant une racine primitive p -ième de l'unité coïncide avec le minimum des dimensions des représentations fidèles du groupe sur le corps.

DANIEL KRASHEN, University of Georgia, Athens, Georgia, USA
Field patching, quadratic forms and division algebras

In this talk I will discuss applications of the method of field patching, recently developed by Harbater and Hartmann, towards problems in quadratic forms and division algebras. In particular, I will discuss approaches to the computation of the u -invariant and approaches to the period-index problem for certain fields of the form $K(C)$ where K is a complete discretely valued field and C is a curve over K .

This is joint work with Harbater and Hartmann.

JOCHEN KUTTLER, Alberta
Lifting automorphisms of matrix invariants

Let G be a reductive group over an algebraically closed field of characteristic zero. We study the question when automorphisms of the categorical quotient $V//G$ may be lifted to V where V is the representation given by several copies (generally at least two) of the adjoint representation of G . As an application we determine the way an automorphism of $V//G$ may act on the Luna stratification of $V//G$, a question studied earlier jointly with Z. Reichstein in the case of matrices.

AHMED LAGHRIBI, Faculté Jean Perrin, rue Jean Souvraz, SP 18, F-62307 Lens, France
A complement to the ν -invariant in characteristic 2

For a field F of characteristic 2, let $\nu'(F)$ be the smallest integer n such that $(IF)^n = 0$ (if this minimum exists), where IF is the ideal of even dimensional bilinear forms over F . In our talk, we give a complete answer to the behavior of the invariant $\nu'(F)$ under finite extensions of F . This completes a previous work by Aravire and Baeza where the same problem was considered for the ν -invariant defined by the filtration $(IF)^n \otimes W_q(F) = 0$ of the Witt group $W_q(F)$ of nonsingular quadratic forms over F .

JAN MINAC, The University of Western Ontario, London, Canada
Galois modules and Galois groups

I plan to discuss recent joint work with D. Benson, S. Chebolu, F. Chemotti, I. Efrat, N. Lemire, A. Schultz, and J. Swallow related to the Galois module structure of Galois cohomology and its influence on the structure of certain p -extensions of fields.

ARTURO PIANZOLA, University of Alberta, Edmonton
Descent constructions in infinite dimensional Lie theory

Many interesting objects in infinite dimensional Lie theory can be thought as being finite dimensional when viewed not as objects (algebras, groups. . .) over the base field (usually the complex numbers), but rather as objects over their centroids (usually a Laurent polynomial ring). From this point of view, the language of torsors and descent constructions arise naturally. I will present several examples of how these methods can be used to study a class of algebras intimately related to the affine Kac–Moody Lie algebras.

ANNE QUÉGUINER-MATHIEU, Universités Paris 12 / Paris 13
Pfister's theorem for orthogonal involutions

In the 60's, Pfister proved strong theorems describing quadratic forms of even dimension ≤ 12 that have trivial discriminant and Clifford invariant, i.e., that are in I^3 . His results have been extended to quadratic forms of dimension 14 in I^3 by Rost in 1999. One knows also extensions of these theorems where quadratic forms are replaced by central simple algebras with orthogonal involution, except in degree 12. Using Rost's argument—that is the fact that a projective representation of Spin_{12} has an open orbit—we produce a generalization of Pfister's result; the statement is in terms of 'quadratic extensions' of algebras with involution.

This talk is based on a joint work with S. Garibaldi.

NICOLAS RESSAYRE, Université Montpellier 2, CC51, Place Eugène Bataillon 34095, Montpellier Cedex, France
Restricting representations to a reductive subgroup

Let G be a reductive subgroup of a reductive group G' . We are interested to the irreducible representation $V(\lambda)$ of G which occurs as subrepresentation of a given irreducible representation $V(\lambda')$ of G' . More precisely, we consider the convex cone C generated by the pairs (λ, λ') as above. In fact, these cones have numerous interpretations and a rich history. Here, we will explain how Geometric Invariant Theory allows us to give an almost minimal list of linear inequalities which characterizes C .

RUPERT YU, Université de Poitiers, Boulevard Marie et Pierre Curie, Téléport 2, BP 30179, 86962 Futuroscope Chasseneuil Cedex, France
Quelques problèmes sur les algèbres de Lie biparaboliques

Les algèbres de Lie biparaboliques sont des stabilisateurs de certains paires de drapeaux. Celles-ci ont été introduites par Dergachev et Kirillov pour $\mathfrak{gl}(n)$, puis par Panyushev pour les algèbres de Lie réductives, pour donner de nouveaux exemples d'algèbres de Lie d'indice zéro.

Dans cet exposé, nous expliquons les motivations qui ont conduit Dergachev et Kirillov à définir ces algèbres de Lie, et nous présentons des résultats récents sur ces algèbres de Lie. En particulier, nous expliquons comment les représentations de certains carquois nous aident à étudier une question de Duflo et de Panyushev sur les classes de conjugaison des éléments dans le radical nilpotent de ces algèbres de Lie.

Ces travaux sont en commun avec Patrice Tauvel, et avec Bernt Tore Jensen et Xiuping Su.