Martin Bright (University of Leiden)

Torsors, obstructions and models

Abstract: Torsors under algebraic groups can be used to study rational points, by giving obstructions to local-global principles. The most well-known of these is the Brauer-Manin obstruction. I will describe examples showing how good and bad reduction of torsors can be used to further understand these obstructions.

Ting-Yu Lee (Taiwan National University)

Isometries of lattices with prescribed characteristic polynomials and Brauer-Manin obstructions

Abstract: Given a reciprocal polynomial f and a lattice L, one asks if there is an isometry of Lwith characteristic polynomial f. In a series of papers of Eva Bayer-Fluckiger and others, they give sufficient and necessary conditions for such an isometry to exist. In this talk, I will approach this problem from a different point of view. I will first construct a homogeneous space of SL_n, and showthat each rational point of the homogeneous space corresponds to an isometry of the vector space associated to L. In this setting, the isometries of the lattice itself corresponds to integral points of the homogeneous space. Then we use the integral Brauer-Manin obstructions and strong approximation to solve this problem. This is an on-going project with Y. Cao, Y. Hu, Y. Tian and F. Xu.

Fabien Morel (Munich University)

The simplicial Bruhat-Tits building of a split semi-simple simply connected group over a field F

Abstract: Given a field F and an F-group G as in the title, we define a simplicial building $I^G_\bullet(F)$, which means a simplicial object of the category of simplicial complexes. In degree n, $I^G_n(F)$ is a contractible subcomplex of the Bruhat-Tits building associated to G with the function field of the n-dimensional affine space $\mathbb{A}^n_F$, endowed with the discrete valuation corresponding to the linear embedding at infinity $\mathbb{P}^{n-1} \subset \mathbb{P}^n$.

This is part of my program to prove the Friedlander-Milnor conjecture. I will mostly describe the case $G = \mathrm{SL}_r$.

Nguyễn Manh Linh

Local-global principle for nonabelian second Galois cohomology over p-adic function fields

Abstract: In the past 30 years, nonabelian second Galois cohomology has been systematically used to study the existence of rational points on homogeneous spaces. We present a local–global principle for neutrality in this cohomology set for simply connected semisimple linear algebraic groups, relative to the overfields of a given semiglobal field (such as the function field of a p-adic

curve) in the patching setting. As an application, we address a variant of a conjecture by Colliot-Thélène–Parimala–Suresh regarding projective homogeneous spaces. Our method is a case-by-case analysis on the type of the group. This is a joint work with Ramdorai Sujatha.

Danny Ofek (University of British Columbia)

Root-theoretic bounds on the essential dimension of split reductive groups

Abstract: Let G be an algebraic group over a field. The essential dimension of G, denoted $ed(G)$, is the minimal number of algebraically independent parameters required to define an arbitrary G-torsor. Often G-torsors classify a class of algebraic objects, in which case $ed(G)$ measures the complexity of a general member of that class. For example, $ed(\mathrm{PGL}_n)$ is the number of parameters needed to define a generic division algebra of degree n. We will explain how loop torsors can be used to relate the essential dimension of a split reductive group to the combinatorial complexity of its root system. As an application, we prove new lower bounds on $ed(G)$ for various split simple algebraic groups G. In the case of PGL_n, we recover Merkurjev's celebrated lower bound with a simplified proof.

R. Preeti (IIT Bombay)

Classical adjoint groups and R-equivalence over function fields of p-adic curves

Abstract: Let F be the function field of a smooth geometrically integral curve over a p-adic field. Let G be a classical adjoint group over F. We discuss the triviality of $G(F)/R$ for various groups G and the rationality of the underlying varieties.

Anne Quéguiner-Mathieu (Université Sorbonne Paris Nord),

On the Artin-Springer theorem in Schur index 2 (or a new proof of a theorem of Parimala-Sridharan-Suresh)

Abstract: Based on a joint work with J.-P. Tignol. A well known theorem, first established by Artin in 1937, and later published by Springer in 1952, states that an anisotropic quadratic form over a field remains anisotropic under odd-degree field extensions. Whether the same property holds for simple linear algebraic groups of type D is a largely open question. In characteristic different from 2, groups of type D are described in terms of hermitian forms with values in a division algebra. When this algebra is a quaternion algebra, the question has a positive answer, due to Parimala Sridharan and Suresh (2001). Their argument reduces the problem to the quadratic form case, and uses the excellence property of function fields of conics, which are generic splitting fields for quaternion algebras. In this talk I will present a new proof of their result, which avoids the excellence argument.

Sandeep Varma (TIFR)

On Harish-Chandra's Notion of an Admissible Distribution

Abstract: Building on J.-L. Waldspurger's work, S. DeBacker proved the Hales-Moy-Prasad conjecture under specific hypotheses. This result established an explicit range of validity for Harish-Chandra's asymptotic character expansion for an irreducible admissible representation of a p-adic reductive group at the identity. Subsequent generalizations by J-L Kim and F. Murnaghan, J. Adler and J. Korman, and L. Spice, extended these results to finer character expansions and regions away from the identity. However, Harish-Chandra's original proof was formulated more broadly for the class of "admissible distributions." This talk, based on joint work with J. Adler and E. Sayag, discusses analogues of admissibility tailored to these more explicit expansions, and their generalization to the setting of p-adic symmetric spaces.

Anand Sawant (TIFR)

R-equivalence and $\mathbb{A}^1$-connected components

Abstract: I will describe the relationship between the group of R-equivalence classes in an algebraic group and the sheaves of its naive and genuine $\mathbb{A}^1$-connected components. I will also describe how some classical questions involving R-equivalence and near-rationality properties of algebraic groups can be possibly accessed through $\mathbb{A}^1$-homotopy theoretic methods. The talk is partly based on some old and recent works with Chetan Balwe and Amit Hogadi.

Anastasia Stavrova (PDMI RAS and St. Petersburg State University)

On the generalized Bass-Quillen conjecture in dimension 2

Abstract: Let A be a regular ring of dimension less or equal to 2. Let G be a split, i.e. Chevalley–Demazure, reductive group. We prove that every Zariski-locally trivial principal G-bundle over a ring of polynomials $A[x_1, ..., x_n]$ is extended from A. This result generalizes to split reductive groups the dimension 2 case of the Bass-Quillen conjecture on finitely generated projective modules, settled in positive by M. P. Murthy.

Srimathy Srinavasan (TIFR)

Complete homogeneous varieties in characteristic $p > 0$

Abstract. In this talk, we will discuss complete homogeneous varieties under the action of a smooth connected algebraic group G over an arbitrary perfect field of characteristic $p > 0$. Unlike the case when the base field is of characteristic zero, we encounter non-smooth parabolics as isotropy subgroups. This gives rise to a much wider and exotic class of projective homogeneous varieties. We will classify these varieties as well as describe their geometric structure and properties. Based on a joint work in progress with Michel Brion and Matilde Maccan.

Haowen Zhang

Description of the strong approximation locus using Brauer-Manin obstruction for homogeneous spaces with commutative stabilizers

Abstract: For a homogeneous space X over a number field k, the Brauer-Manin obstruction has been used to study strong approximation for X away from a finite set S of places, and known results state that $X(k)$ is dense in the omitting-S projection of the Brauer-Manin set, under certain assumptions. We ask:

(i) whether $pr_S(X(A)^{Br})$ is closed in $X(A_S)$;

(ii) whether $X(k)$ is dense in the closed subset of $X(A_S)$ cut out by elements in $\mathrm{Br}(X)$which induce zero evaluation maps at all the places in S.

We give answers to such questions for homogeneous spaces X under semisimple simply connected groups with commutative stabilizers.

Anis Zidani (Sorbonne Université)

Arithmetic of Bruhat-Tits Group Schemes over a Semi-Local Dedekind Ring

Abstract : The aim of this talk is to lay the foundations for the cohomological study of Bruhat-Tits group schemes over a semi-local Dedekind ring. In particular, we obtain a simplified proof of the Grothendieck-Serre conjecture in this case and also an analogous result for Bruhat-Tits group schemes of a semisimple simply connected group.