
Representation Theory of Groups Defined Over Local Fields
Théorie des représentations de groupes définis sur des champs locaux
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NICOLAS ARANCIBIA, Carleton University

A(rthur)-Packets of Cohomological Representations

For classical real groups we can list three important constructions of $A(rthur)$ -packets. We can begin by mentioning the definition due to Arthur that appears in his work on the classification of the discrete automorphic spectrum of classical groups, and that relies on techniques from harmonic analysis. A second and radically different definition is due to Adams, Barbasch and Vogan. Their approach to A -packets is by means of sophisticated geometrical methods, using the theory of perverse sheaf, \mathcal{D} -modules and some others tools from microlocal geometry. A third construction in the context of unitary representations with cohomology, is due to Adams and Johnson. The aim of this talk is to explain why in this latter context the three constructions coincide.

ED BELK, University of British Columbia

The Local Trace Formula as a Motivic Identity

In 1991, James Arthur published a local trace formula, which is an equality of distributions on the Lie algebra of a connected, reductive algebraic group G over a field F of characteristic zero. His approach was later used by Jean-Loup Waldspurger to give a slight reformulation, identifying the value of a particular distribution on a test function with that of its Fourier transform. We aim to show that this identity may be formulated as an identity of motivic distributions on definable manifolds. By so doing, we would make available the use of the transfer principle to establish the trace formula for groups defined over fields of positive characteristic.

ADELE BOURGEOIS, University of Ottawa

On the Multiplicities in the Restriction of a Supercuspidal Representation

The representation theory of reductive groups over p -adic fields can be split into two areas, namely the study of parabolically induced representations and the study of supercuspidal representations. Given a reductive group G defined over a p -adic field F , one can construct supercuspidal representations of any positive depth via the Adler-Yu construction. This construction uses what Yu called a G -datum. It was later proved by Kim-Fintzen that these constructions exhaust all positive depth supercuspidal representations for large enough p .

In this talk, we will be interested in the restriction of a positive depth supercuspidal of $G(F)$ to the subgroup $G_{der}(F)$, where G_{der} denotes the derived subgroup of G . The goal is to further explore a conjecture regarding multiplicity one established by Adler and Prasad. To understand such a restriction, we first define how to restrict a G -datum to G_{der} -data. We can then study how the supercuspidals arising from the various G_{der} -data produced appear in the restriction to $G_{der}(F)$ of the supercuspidal arising from the initial G -datum. The question of multiplicity one in this restriction then reduces to the study of certain depth zero supercuspidal representations.

BOAZ ELAZAR, UBC

Schwartz Functions And Tempered Distributions On Singular Quasi-Nash Varieties

Schwartz functions and tempered distributions are important tools in representation theory and are used, for example, in studying closures of orbits of group actions. Those closures might be singular semi-algebraic varieties. For the study of Schwartz functions on such varieties, I shall introduce the space of quasi-Nash varieties. I will show how Schwartz functions and tempered distributions can be defined on quasi-Nash varieties, and will discuss several important properties of those functions. If time permits, I will talk about integrating Schwartz functions over singular algebraic curves.

NICOLE KITT, University of Calgary

An ABV-packet for a General Linear Group with Two Representations

It is known that not all ABV-packets are Arthur packets, and in particular, that Arthur packets for general linear groups are singletons. My research project concerns, what is believed to be, the smallest known example of an ABV-packet for a general linear group that is not a singleton, and hence is not of Arthur type. Specifically, I will be completing a calculation with C. Cunningham which shows that there is an irreducible admissible representation π of p -adic $\mathrm{GL}(16)$ with the property that its ABV-packet contains exactly one other irreducible representation, π' .

The main tool we are using to calculate the ABV-packet for p -adic $\mathrm{GL}(16)$ is the functor Ev which is built from Deligne's vanishing cycles functor. In this talk, I will illustrate the methods used to compute this functor. In particular, we will discuss geometric techniques used to calculate perverse sheaves and their microlocal vanishing cycles on quiver representation varieties of type A.

JOSHUA LANSKY, American University

Explicit liftings of conjugacy classes in finite reductive groups

Let k be a field, \tilde{G} a connected reductive k -group, and Γ a finite group. Previous work with Adler defined what it means for a connected reductive k -group G to be *parascopic* for (\tilde{G}, Γ) . (Roughly, this is a generalization of the situation where Γ acts on \tilde{G} , and G is the connected part of the group of Γ -fixed points in \tilde{G} .) In this setting, there is a canonical map \mathcal{N}^{st} of stable semisimple conjugacy classes from the dual $G^\wedge(k)$ to $\tilde{G}^\wedge(k)$. When k is finite, this implies a lifting from packets of representations of $G(k)$ to those of $\tilde{G}(k)$. After reviewing this theory, we describe a method for decomposing a given instance of parascopy into simple atomic components for which \mathcal{N}^{st} arises from an explicit k -morphism $G^\wedge \rightarrow \tilde{G}^\wedge$. As a consequence, our lifting of representations is seen to be compatible with Shintani lifting in some important cases. In other cases, our lifting factors through the set of representations of an intermediate group.

DANIEL LE, University of Toronto

mod p representations of p -adic GL_2

Congruences between automorphic forms and Galois representations have proven to be powerful tools in the Langlands program. The search for a representation-theoretic framework for these congruences naturally leads us to study mod p representations of p -adic groups. Rather little is presently known about the characteristic p case, which seems to be substantially different from other characteristics. We will highlight some recent results and questions in the area, mainly focusing on the case of GL_2 .

PAUL MEZO, Carleton University

Equivalent definitions of Arthur-packets for real classical groups

In his most recent book, Arthur defines A(rthur)-packets for classical groups using techniques from harmonic analysis. For real groups an alternative approach to the definition of A-packets has been known since the early 90s. This approach, due to Adams-Barbasch-Vogan, relies on sheaf-theoretic techniques instead of harmonic analysis. We will report on work in progress, joint with N. Arancibia, in proving that these two different definitions for A-packets are equivalent for real classical groups.

DAVID ROE, Massachusetts Institute of Technology

A database of p -adic tori

Maximal tori in reductive groups form the foundation for many constructions in p -adic representation theory. Many of these constructions place constraints on the tori involved, requiring that they split over unramified or tamely ramified extensions of the ground field. When the residue characteristic is small, wild tori occur even for groups of small rank. Such tori complicate standard tools used to construct representations, such as Bruhat-Tits buildings, Néron models and the Moy-Prasad filtration. In an effort to aid in the study of representations in small characteristic, I will present an online database of p -adic tori.

As the database is still at an early stage, I will be soliciting feedback on what kinds of data, presentation or search features would be most useful to researchers in the audience.

HADI SALMASIAN, University of Ottawa

The minimal faithful dimension of finite p -groups: an application of the orbit method to the essential dimension

For a finite group G and a field K , the faithful dimension of G over K is defined as the smallest possible dimension of a faithful K -representation of G . By a result of Karpenko and Merkurjev, if G is a p -group and K contains a primitive p -th root of unity, then the faithful dimension of G is equal to the essential dimension of G over K , a notion introduced by Buhler and Reichstein. We use the orbit method to obtain qualitative and quantitative results on the faithful dimension of G for a wide range of examples. This is joint work with M. Bardestani and K. M. Karai.

LOREN SPICE, Texas Christian University

New developments in the construction of tame, supercuspidal representations

In 2012, Yu gave a talk at American University suggesting the possibility of a new perspective on his construction of tame, supercuspidal representations that would make it more compatible with the local Langlands correspondence. Surprisingly, this compatibility hinges on a small detail, which is the nature of the lifting to a genuine representation of the projective representation of a finite symplectic group called the Weil representation. In joint work with DeBacker, I described an appropriate modification for so called toral supercuspidal representations. Kaletha's work on regular supercuspidal representations suggests a vast generalisation of the work with DeBacker. In this talk, I will report on joint work in progress with Fintzen and Kaletha involving how to perform the necessary modifications to the Weil representation in the setting of regular, and hopefully all tame, supercuspidal representations.

WAN-YU TSAI, University of Ottawa

The orbit philosophy for Spin groups

Let G be a semisimple Lie group with Lie algebra \mathfrak{g} and maximal compact subgroup K . The philosophy of coadjoint orbits suggests a way to study unitary representations of G by their close relations to the coadjoint G -orbits on \mathfrak{g}^* . In this talk, we study a special part of the orbit philosophy. We provide a comparison between the K -structure of unipotent representations and regular functions of bundles on nilpotent orbits for complex and real groups of type D . More precisely, we provide a list of genuine unipotent representations for a Spin group; separately we compute the K -spectra of the regular functions on certain small nilpotent orbits, and then match them with the K -types of the genuine unipotent representations. This is joint work with Dan Barbasch.

QING ZHANG, University of Calgary,

local converse theorems for unitary groups

Let F be a p -adic field and E/F be a fixed quadratic extension. Let $U_n(F)$ be the quasi-split unitary group of size n with $n \geq 2$ associated with E/F . The local converse theorem asserts that, an irreducible (supercuspidal) generic representation π of U_n is uniquely determined by various local gamma factors $\gamma(s, \pi \times \tau, \psi)$ of π twisted by irreducible generic representations τ of $GL_k(E)$, $1 \leq k \leq [\frac{n}{2}]$, where ψ is a fixed nontrivial additive character of F . In this talk, I will give a sketch of a recent proof of this theorem when n is odd.