
Representation Theory
Théorie des représentations
(Org: **Clifton Cunningham** (Calgary) and/et **David Roe** (UBC))

AARON CHRISTIE, Carleton

GERALD CLIFF, University of Alberta

PBW and canonical bases of modules for Lie algebras and quantum groups

Let V be an irreducible representation of a finite-dimensional complex semi-simple Lie algebra. Then $V = U^-v$ where U^- is the universal enveloping algebra of the minus part of the Lie algebra. We want to find an explicit subset S of a PBW basis of U^- such that a basis of V is given by all sv , where s varies in S . In the quantized case, we show that such a subset S can be given using Lusztig's canonical and PBW bases of U_q^- . In type A , S can be explicitly given in terms of Young tableaux, similar to the bases of Carter-Lusztig in 1974. We have results for types B , C , and D , using Kashiwara's crystal bases, and the Young tableaux of types B , C , and D of Kashiwara-Nakashima.

ANDREW FIORI, University of Calgary

Understanding the Category of Algebraic Groups over a Field

In this talk I will discuss the problem of giving concrete descriptions for all morphisms in the category of algebraic groups over a field. I will discuss why this problem is hard in almost any generality but also how we are able to say a great deal in many specific cases.

JULIA GORDON, University of British Columbia

Transfer of transfer

This is joint work with T.C. Hales. Langlands and Shelstad made two conjectures about the relations of kappa-orbital integrals on a reductive group G and stable orbital integrals on the endoscopic group H . One was the famous Fundamental Lemma. The other one is a "smooth transfer" conjecture, which asserts a relation similar to the Fundamental Lemma but for all smooth test functions on G . It follows from the work of Langlands-Shelstad, Hales and Waldspurger that the Fundamental Lemma implies smooth transfer conjecture in characteristic zero. We use this fact and the theory of motivic integration to show that the smooth transfer conjecture holds in large positive characteristic.

CAMELIA KARIMIANPOUR, University of Ottawa

On the Representations of the n -fold Metaplectic Groups

n -fold metaplectic groups are the central extensions of a simply-connected Chevalley group by the group of n -th roots of unity. In this talk, we consider the n -fold metaplectic group of SL_2 over a p -adic field and compute the K -types of the principal series representations of these covering groups. Among these representations are the reducible unramified principal series representations for which we investigate the distribution of the K -types into its irreducible constituents.

PAUL MEZO, Carleton

A method for computing A -packets for real groups

A -packets are sets of representations which help describe the discrete spectrum of automorphic representations. We will present a method for computing A -packets for real symplectic and orthogonal groups following the definition given by Arthur.

AHMED MOUSSAOUI, University of Calgary
Bernstein centre for enhanced Langlands parameters

In this talk, we consider the links between parabolic induction and the local Langlands correspondence for representations of p -adic groups. We will introduce the notion of cuspidal enhanced Langlands parameter, and these parameters should correspond to the supercuspidal representations of p -adic groups. We are able to verify this in those known cases of the local Langlands correspondence, notably by the work of C. Mœglin. Furthermore, in the case of classical groups, we can construct the "cuspidal support" of an enhanced Langlands parameter and get a decomposition of the set of enhanced Langlands parameters à la Bernstein. We show there is a bijection between the irreducible representations in a Bernstein bloc and enhanced Langlands parameters in the corresponding bloc.

Dans cet exposé, on s'intéresse aux liens entre l'induction parabolique et la correspondance de Langlands. En introduisant la notion de paramètre de Langlands enrichi cuspidal, on vérifie grâce au cas connu de la correspondance de Langlands locale et des travaux de C. Mœglin que ces paramètres devraient correspondre conjecturalement aux représentations supercuspidales. Par ailleurs, dans le cas des groupes classiques, on construit le "support cuspidal" d'un paramètre de Langlands enrichi. On obtient ainsi une décomposition des paramètres de Langlands enrichis à la Bernstein et une bijection entre les représentations irréductibles d'un bloc de Bernstein et les paramètres de Langlands enrichis d'un bloc correspondant.

MONICA NEVINS, University of Ottawa
On nilpotent orbits of p -adic special orthogonal groups

The classification of nilpotent (co)adjoint orbits of p -adic groups is in some sense known in the classical case through work of Waldspurger and in general through work of DeBacker. That said, enumerating, or generating explicit representatives of, these orbits is highly nontrivial. In prior work, the author determined an algorithm for relating these two classifications for special linear and symplectic groups, via the intermediary of explicit orbit representatives. This talk concerns recent progress on the case of special orthogonal groups. This is joint work with Tobias Bernstein.

HADI SALMASIAN, University of Ottawa
Local and global rank for the discrete spectrum

I will review the notion of U -rank of a unitary representation, and outline the proof of the following theorem: all of the local components of an automorphic representation in the discrete spectrum have equal U -rank. This generalizes a result of R. Howe from the 1980's. In particular, for an automorphic representation in discrete spectrum, minimality of one local component implies minimality of all local components.

LOREN SPICE, Texas Christian University
Asymptotic expansions of characters

Harish-Chandra made the analogy that characters (of irreducible representations) are to a reductive group as Fourier transforms of orbital integrals are to its Lie algebra. This was formalised by the Harish-Chandra–Howe local character expansion (about arbitrary semisimple elements) in terms of Fourier transforms of nilpotent orbital integrals, and later by the Kim–Murnaghan–Kirillov asymptotic expansion (about the identity) in terms of Fourier transforms of orbital integrals with a fixed semisimple part. In this talk, we discuss an analogue of the Kim–Murnaghan–Kirillov expansion (for characters and related distributions) about arbitrary points, and how to compute it effectively for supercuspidal characters.

BIN XU, University of Calgary
On Arthur packets of p -adic split odd orthogonal groups

The irreducible admissible representations of Arthur class are the local components of automorphic representations. They are conjectured to be parametrized by the Arthur parameters, which form a subset of the usual Langlands parameters. The

set of irreducible representations associated with a single Arthur parameter is called an Arthur packet. Following Arthur's classification theory of automorphic representations of classical groups, the Arthur packets are now known in these cases. On the other hand, Mœglin independently constructed these packets in the p -adic case by using very different methods. In this talk, I would like to give a survey on Mœglin's construction in the special case of split odd orthogonal groups, and I will also explain how it is connected with Arthur's theory.