WINTER SCHOOL 2016 ON REPRESENTATION THEORY OF REAL REDUCTIVE GROUPS

Graduate School of Mathematical Sciences, the University of Tokyo
January 22 (Fri)–27 (Wed), 2016

January 22 (Fri), Room 123

10:00–11:00 Yiannis Sakellaridis
(Rutgers University and the National Technical University of Athens)
Mini-course on the Relative Langlands Program

11:20–12:20 Tobias Weich (Paderborn University)
Wavefront sets of unitary Lie group representation

14:00–15:00 Yiannis Sakellaridis
(Rutgers university and the National Technical University of Athens)
Mini-course on the Relative Langlands Program

January 23 (Sat), Room 123

10:00–11:00 Yiannis Sakellaridis
(Rutgers university and the National Technical University of Athens)
Mini-course on the Relative Langlands Program

11:20–12:20 Tobias Weich (Paderborn University)
Wavefront sets of unitary Lie group representation

14:00–15:00 Yiannis Sakellaridis
(Rutgers University and the National Technical University of Athens)
Mini-course on the Relative Langlands Program

January 25 (Mon), Room 002

10:00–11:00 Jeffrey Adams (University of Maryland)
Atlas of Lie Groups and Representations

11:20–12:20 Yiannis Sakellaridis
(Rutgers University and the National Technical University of Athens)
Mini-course on the Relative Langlands Program

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14:00–16:00 Jeffrey Adams (University of Maryland)
Atlas of Lie Groups and Representations

16:30–17:30 Tobias Weich (Paderborn University)
Wavefront sets of unitary Lie group representation

January 26 (Tue), Room 002(a.m.), 128(p.m.)

10:00–11:00 Jeffrey Adams (University of Maryland)
Atlas of Lie Groups and Representations

11:20–12:20 Yiannis Sakellaridis
(Rutgers University and the National Technical University of Athens)
Mini-course on the Relative Langlands Program

14:00–16:00 Jeffrey Adams (University of Maryland)
Atlas of Lie Groups and Representations

16:30–17:30 Wan-Yu Tsai (Institute of Mathematics Academia Sinica)
Some small genuine representations of a nonlinear cover and the model orbit

January 27 (Wed), Room 117

10:00–11:00 Jeffrey Adams (University of Maryland)
Atlas of Lie Groups and Representations

11:20–12:20 Yiannis Sakellaridis
(Rutgers University and the National Technical University of Athens)
Mini-course on the Relative Langlands Program

14:00–16:00 Jeffrey Adams (University of Maryland)
Atlas of Lie Groups and Representations

Jeffrey Adams (University of Maryland)

Atlas of Lie Groups and Representations

Abstract:

The Atlas of Lie Groups and Representations is a software project to compute the unitary dual of an arbitrary real Lie group. I will be giving on overview of the project in a series of 6 lectures (9 hours total). I will give some mathematical background, and spend some time on a tutorial on getting started using the software. I will use the software during the presentation. It is not necessary, but users can download and install the software at www.liegroups.org.

Yiannis Sakellaridis

(Rutgers University and the National Technical University of Athens)

Mini-course on the Relative Langlands Program

Abstract:

In this series of talks, aimed primarily at graduate students who have some familiarity with reductive groups and harmonic analysis, I will outline a generalization of the Langlands program inspired from the work of Jacquet, D. Prasad and others. The basic objects here are spherical varieties, a very interesting class of varieties with a group action that generalizes symmetric spaces and has been studied systematically by Brion, Knop, Luna, Vust and others. Familiarity with the Langlands program will not be required: it will be obtained as a special case, when the spherical variety is a reductive group H, thought of as a symmetric space under the action of H x H by left and right multiplication.

Schedule of lectures:

1) Introduction to automorphic forms in the language of adeles.

2) Basic structure theory of spherical varieties.

3) Representation theory and harmonic analysis on reductive groups and spherical varieties.

4) Global period integrals and their conjectural factorization.

5) Generalizations of the Casselman-Shalika formula, and the L-function of a spherical variety.

6) The relative trace formula.

7) Local and global harmonic analysis on algebraic stacks.

Tobias Weich (Paderborn University)
Wavefront sets of unitary Lie group representation
Abstract:

Wavefront sets (or the singular spectrum) are a central tool in microlocal analysis and they have been introduced around 1970 by Sato and Hörmander in the context of PDEs in order to measure singularities of distributions. Around 1980 Kashiwara-Vergne and Howe showed how one can transfer the notion of wavefront sets from distributions to unitary representations of Lie-groups and that this notion is very useful to study questions in harmonic analysis.

In this lecture series we will first introduce the notion of wavefront sets for distributions and illustrate their meaning by a few examples. We will then introduce the notion of the wavefront sets of a unitary representations and its use in representation theory. In particular we will emphasize the relation to the orbit method. Finally we will focus on a recent joint work with Benjamin Harris and we will see how techniques for the regularization of oscillating integrals can be used to determine the wavefront sets of induced representations.

Wan-Yu Tsai (Institute of Mathematics Academia Sinica)
Some small genuine representations of a nonlinear cover and the model orbit
Abstract:

Let G be the real points of a simply laced, simply connected complex Lie group, and G be the nonlinear two-fold cover of G. We will discuss a set of small genuine representations of G , denoted by Lift(C), which can be obtained from the trivial representation of G by a lifting operator. The representations in Lift(C) can be characterized by the following properties: (a) the infinitesimal character is $\rho/2$; (b) they have maximal tau-invariant; (c) they have a particular associated variety Ø. We will use the split real group of type D_{2n} as an example to exhibit the following further consequences: (1) all representations in Lift(C) are parametrized by pairs (central character, real form of Ø); (2) The K-structure of the regular functions on a real form of Øis multiplicity free and matches up with the K-types of the small representations in Lift(C) attached to that real orbit.

Organizers: T. Kobayashi, T. Kubo, H. Sekiguchi

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