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Abstracts

ICM Section 7 (Lie Theory and Generalizations)

July 2022

1 Raphael Beuzart-Plessis

Aix-Marseille University, France
Relative trace formulae and the Gan-Gross-Prasad conjectures

Abstract

In this talk, I will report on some recent progress that have been made on the so-called Gan-Gross-Prasad conjectures through the use of relative trace formulae. In their global aspects, these conjectures, as well as certain refinements first proposed by Ichino-Ikeda, give precise relations between the central values of some higher-rank L-functions and automorphic periods. There are also local counterparts describing branching laws between representations of classical groups. In both cases, approaches through relative trace formulae have shown to be very successful and have even lead to complete proofs, at least in the case of unitary groups. However, the works leading to these definite results have also been the occasion to develop further and gain new insights on these fundamental tools of the still emerging relative Langlands program.

2 Evgeny Feigin

HSE University, Russia
PBW degenerations, quiver Grassmannians, and toric varieties

Abstract

We present a review on the recently discovered link between the Lie theory, the theory of quiver Grassmannians, and various degenerations of flag varieties. Our starting point is the induced Poincaré–Birkhoff–Witt filtration on the highest weight representations and the corresponding PBW degenerate flag varieties.

3 Tasho Kaletha

University of Michigan, USA
Representations of reductive groups over local fields

Abstract

We discuss progress towards the classification of irreducible admissible representations of reductive groups over non-archimedean local fields and the local Langlands correspondence.

4 Yiannis Sakellaridis

Johns Hopkins University, USA
Spherical varieties, functoriality, and quantization

Abstract

We discuss generalizations of the Langlands program, from *reductive groups* to the local and automorphic spectra of *spherical varieties*, and to more general representations arising as "quantizations" of suitable Hamiltonian spaces. To a spherical G-variety X, one associates a *dual group* ${}^LG_X$ and an L-*value* (encoded in a representation of ${}^LG_X$), which conjecturally describe the local and automorphic spectra of the variety. This sets up a problem of functoriality, for any morphism ${}^LG_X \to {}^LG_Y$ of dual groups. We review, and generalize, Langlands' "beyond endoscopy" approach to this problem.

Then, we describe the cotangent bundles of quotient stacks of the relative trace formula, and show that transfer operators of functoriality between relative trace formulas in rank 1 can be interpreted as a change of "geometric quantization" for these cotangent stacks.

5 Binyong Sun and Chen-Bo Zhu

Zhejiang University, China and National University of Singapore, Singapore

Theta correspondence and the orbit method

Abstract

The theory of theta correspondence, initiated by R. Howe, provides a powerful method of constructing irreducible admissible representations of classical groups over local fields. For archimedean local fields, a principle of great importance is the orbit method introduced by A. A. Kirillov, and it seeks to describe irreducible unitary representations of a Lie group by its coadjoint orbits. In this lecture, we examine implications of Howe's theory for the orbit method and unitary representation theory, with a focus on a recent work of Barbasch, Ma, and the speakers on the construction and classification of special unipotent representations of real classical groups (in the sense of Arthur and Barbasch-Vogan).

6 Weiqiang Wang

University of Virginia, USA

What is an i-quantum group, and what is it good for?

Abstract

Quantum groups were the subject of Drinfeld's 1986 ICM lecture, and have found since then spectacular applications in math physics, representation theory, quantum topology, and so on. iQuantum groups arise from quantum symmetric pairs introduced by G. Letzter around 2000. We shall explain why it is natural to view i-quantum groups as a vast generalization of quantum groups. Then we shall discuss some recent developments and applications of i-quantum groups.