22nd Autumn Workshop on Number Theory

Date: October 30th – November 3rd in 2019
Venue: Hotel Abest Happo Aldea

Abstract

October 30th

Hiraku Atobe (Hokkaido University)
Introduction to Arthur's multiplicity formula
Arthur's multiplicity formula, which is a beyond to the Langlands program for GL_n, is a classification of square-integrable automorphic representations of classical groups. In this talk, as an introduction to the Langlands program, I will explain Arthur's multiplicity formula assuming the Langlands hypothetical groups.

October 31st

Kazuki Morimoto (Kobe University)
Arthur's multiplicity formula for symplectic groups
In this talk, I will define global A-parameters in terms of irreducible cuspidal automorphic representations of $\mathrm{GL}(n)$ and explain Arthur's multiplicity formula for symplectic groups in detail assuming the existence of local A-packets.

Yuanqing Cai (Kyoto University)
Twisted doubling integrals for classical groups
In the 1980s, Piatetski-Shapiro and Rallis discovered a family of Rankin-Selberg integrals for the classical groups that did not rely on Whittaker models. This is the so-called doubling method. It grew out of Rallis' work on the inner products of theta lifts – the Rallis inner product formula.

In this talk, we present a family of Rankin-Selberg integrals (the twisted doubling method, in joint work with Friedberg, Ginzburg, and Kaplan) for the tensor product L-function of a pair of automorphic cuspidal representations, one of a classical group, the other of a general linear group. This can be viewed as a generalization of the doubling integrals of Piatetski-Shapiro and Rallis. Time permitting, we will discuss the twisted doubling integrals for Brylinski-Deligne covers of classical groups.

Yoshiki Oshima (Osaka University)
Cohomological representations of symplectic groups
This is a survey talk on $A_{\mathfrak{q}}(\lambda)$ or cohomological representations of the real symplectic group $\mathrm{Sp}(2n,\mathbb{R})$. In particular, I would like to discuss which cohomological representations are highest weight modules and describe Adams-Johnson packets.

Atsushi Ichino (Kyoto University)
Application of Arthur's multiplicity formula

We explain how Arthur's multiplicity formula implies some lifting theorem for Siegel modular forms which generalizes the Ikeda lifting.

November 1st

David Renard (Centre de mathématiques Laurent Schwartz- Ecole Polytechnique)
Arthur's packets for classical real groups
we will give an overview on our joint work with Colette Moeglin on Arthur's packets for real classical groups. We will show how they can be constructed starting from unipotent packets using cohomological and parabolic induction. We will then focus on the case of unitary highest weight modules of symplectic groups in connection with applications to the theory of Siegel modular forms.

Hiroshi Ishimoto (Kyoto University)
The Shimura-Waldspurger correspondence for $\mathrm{Mp}(2n)$
This is a survey talk on a work of Gan and Ichino. In 1973, Shimura established a lifting from some Hecke eigenforms of half-integral weight to those of integral weight, and later, Waldspurger studied the Shimura correspondence in the framework of automorphic representations of the metaplectic group $\mathrm{Mp}(2)$ and the special orthogonal groups $\mathrm{SO}(3)$. Gan and Ichino generalized the Shimura-Waldspurger correspondence to $\mathrm{Mp}(2n)$ and $\mathrm{SO}(2n+1)$ of higher rank, and gave a classification of representations of $\mathrm{Mp}(2n)$ by transporting Arthur ' s classification of representations of the odd special orthogonal groups.

November 2nd

Masao Oi (Kyoto University)
Introduction to Arthur's local classification theorem
Recently, in his book, Arthur established a classification result for automorphic representations of classical groups. In this talk, I would like to explain a local counterpart of his classification theorem. More precisely, I will talk about what A-packets and Arthur's local classification theorem are (including the local Langlands correspondence). After that, I will also refer to some topics on further properties satisfied by A-packets, such as the internal structures of unramified A-packets.

Shuji Horinaga (Kyoto University)
Harmonic analysis in the space of nearly holomorphic modular forms and applications
In 80's, Shimura developed the theory of nearly holomorphic modular forms. Recently, Pitale-Saha-Schmidt study its representation theoretic aspects. In this talk, we study the representation theoretic aspect of the space of nearly holomorphic Hilbert-Siegel modular forms. We also determine the structure of the space of them with "sufficiently regular" infinitesimal characters. As applications, we show the surjectivity of Siegel Φ-operator for several cases.

Gaëtan Chenevier (CNRS)
Arthur's endoscopic classification for level 1 algebraic cusp forms of classical

groups over Z and applications to Siegel modular forms

I will first try to explain what Arthur's endoscopic classification concretely says about the level 1 discrete spectrum of classical groups. Then I will show how to use this information, as well as other ingredients, to compute the exact dimension of the space of vector-valued Siegel cusp forms for $\mathrm{Sp}_{2g}(\mathbb{Z})$ of arbitrary weights $k_1 > ... > k_g > g$ and genus $g \leq 8$ (joint work with Olivier Taibi).

Hidenori Katsurada (Muroran Institute of Technology)

Congruence for the Klingen Eisenstein series and Harder's conjecture

Let f be a primitive form in $S_{2k+j-2}(SL_2(\mathbb{Z}))$ with j an even positive integer. Harder's conjecture asserts that the Hecke eigenvalues of f should be related with those of a certain Hecke eigenform in $S_{\det^k \otimes Sym^j}(Sp_2(\mathbb{Z}))$ modulo some prime ideal. So far, this conjecture has been proved only in the case $(k, j) = (10, 4)$ by Chenevier and Lannes. One of main difficulties in treating this conjecture arises from the fact that it is not concerned with the congruence between Hecke eigenvalues of two Hecke eigenforms. In this talk, we propose a conjecture on the congruence between the Klinegen-Eisenstein lift of the Duke-Imamoglu-Ikeda lift and a certain lift of a Hecke eigenform in $S_{\det^k \otimes Sym^j}(Sp_2(\mathbb{Z}))$. This conjecture derives Harder's conjecture. We prove our conjecture, and therefore Harder's for several cases including the case $(k, j) = (10, 4)$.

November 3rd

Shih-Yu Chen (Academia Sinica)

Periods of cusp forms on GSp_4

In this talk, we present our recent work on the periods of cusp forms on $\mathrm{GSp}_4(\mathbb{A}_\mathbb{Q})$. Let π be an irreducible globally generic cuspidal automorphic representation of $\mathrm{GSp}_4(\mathbb{A}_\mathbb{Q})$ with trivial central character. We prove the algebraicity of the critical values of certain automorphic L-functions for $\mathrm{GSp}_4 \times \mathrm{GL}_2$ in terms of the Whittaker periods associated to π. By comparing with the results of Januszewski, Morimoto, and Jiang$-$Sun$-$Tian, when π is stable, we obtain an automorphic analogue of Yoshida's period relation for the conjectural motivic periods attached to π. As an application of the period relation, we prove the algebraicity of the the symmetric sixth power L-functions of elliptic modular forms in terms of certain Petersson norms of holomorphic cusp forms.

Ren-He Su (Sichuan Normal University)

On plus space for Jacobi forms of half-integral weight

Recently, Hayashida showed that, in consideration of the underlying field $\mathbb{Q}$, Kohnen plus space for Jacobi forms of half-integral weight $k + 1/2$ and certain matrix index is isomorphic to a space of Jacobi forms of weight $k + 1$ and certain matrix index. In this talk, we extend his result to the case for arbitrary totally real number fields. For this purpose, to avoid the complexity of calculations, we will adelize the Jacobi forms and use representation theory, which gives a representation theoretical equivalent condition for a Jacobi form of half-integral weight to be in the plus space and this allow us to easily see that the Hecke operators with respect to any odd place of the underlying number field preserve the plus space. Also I am looking forward to show that the isomorphism is a Hecke isomorphism.