

Automorphic Functions and Arithmetic Geometry: A symposium for Prof. L. Lafforgue's visit

Kyushu University, Fukuoka, JAPAN

April 26 - April 28, 2013

Laurent Lafforgue (IHES, France)

Title: Kernels for Langlands' automorphic transfer and non-linear Poisson formulas

Abstract: The main purpose of these six lectures will be to prove that some type of explicit non linear Poisson formulas, which is implied by Langlands' functoriality principle, allows to build 'kernels' of automorphic transfer. So, the functoriality principle is equivalent to these non linear Poisson formulas.

Added by Organizer for students and young researchers:

To understand Prof. Lafforgue's lectures, some preparations should be made. For this, we strongly recommend you the recent talks of Lafforgue at Milano. These talks explained beautifully some of the basics for the fields related. You can go to the website:

<http://portalevideo.unimi.it/?mid=213>

The (active) speed is quite slow. We recommend the user to download them first then watch the videos.

Reference: L. Lafforgue, Noyaux du transfert automorphe de Langlands et formules de Poisson non lineaires, preprint IHES, 2012 available at:

<http://preprints.ihes.fr/2012/M/M-12-28.pdf>

Naoki Imai (University of Tokyo)

Title: Stable models of Lubin-Tate curves with level three

Abstract: We construct the stable model of a Lubin-Tate curve of level three, and prove a realization of the local Langlands correspondence for representations of conductor exponent three in cohomology of Lubin-Tate curves by a purely local method.

Tetsushi Ito (Kyoto University)

Title: Endoscopic decomposition of the cohomology of the Rapoport-Zink space for $GU(3)$

Abstract: It is widely believed that the l -adic cohomology of Rapoport-Zink spaces realize the local Langlands and Jacquet-Langlands correspondences. For the Lubin-Tate spaces or Drinfeld upper half spaces, it was established by Harris-Taylor and Boyer. It turns out that supercuspidal representations of $GL(n)$ appears only in the middle degree cohomology. However, this is not true for more general Rapoport-Zink spaces. In this talk, we consider supercuspidal representations in the cohomology of the Rapoport-Zink space for $GU(3)$. A new phenomenon is that certain supercuspidal representations, which are related to non-tempered endoscopy, appear outside the middle degree. Similar results can be obtained for $GSp(4)$ assuming some form of Arthur's conjecture. This is a joint work with Yoichi Mieda.

Tomokazu Kashio (Tokyo Univ of Science)

Titles: On Shimura's CM-periods and Stark's units over totally real fields

Abstract: We can write CM-periods of abelian CM-fields in terms of special values of gamma function. This also holds for Stark units of abelian extensions of the rational field. Hiroyuki Yoshida conjectured a generalization of such formulas. One of his main ideas is to define the absolute period symbol by using multiple gamma functions. In this talk, we will present some properties of his symbol. In particular we will discuss the algebraicity of its special values.

Haseo Ki (Yonsei Univ, S. Korea)

Titles: The uniqueness of functions in the extended Selberg class

Abstract: I will introduce recent results for the uniqueness of functions in the extended Selberg class. Also, I will talk about a fundamental problem in the Selberg class.

Kotaro Sugahara (Kyushu Univ)

Title: Adelic arithmetic cohomology groups

Abstract: In this talk, we introduce global arithmetic cohomology groups for locally free sheaves on arithmetic varieties and establish some fundamental properties such as duality and inductive long exact sequence of these groups for arithmetic surfaces. The approach we take is an adelic one.

This is a joint work with Prof. Weng.

Takahiro Tsushima (Univ of Tokyo)

Title: Good reduction of ramified affinoids in the Lubin-Tate perfectoid space

Abstract: Recently, in equal characteristic case, Jared Weinstein finds affinoids in the Lubin-Tate perfectoid space and computes their reduction. The cohomology of the reduction realizes the local Langlands correspondence for unramified representations of GL_h . (The corresponding Galois representation to an unramified representation is an induction of a character of Weil group of the unramified extension of degree h .)

In this talk, in equal characteristic case, we introduce other affinoids in the Lubin-Tate perfectoid space, whose reduction realizes ramified representation of conductor $h + 1$. We call them “ramified affinoids”. We explain what kind of variety the reduction is. We study the cohomology of the reduction (in progress). Our talk contains a case where p divides h .

This is a joint work with Naoki Imai.

Shunsuke Yamana (Kyushu Univ)

Title: Periods of Automorphic Forms

Abstract: Periods of automorphic forms play an important role in the theory of automorphic representations and L -functions. Following Jacquet, Lapid and Rogawski, I will discuss a method for defining and computing periods. We define a regularized period of an automorphic form on $GL(n + 1) \times GL(n)$ relative to $GL(n)$ and express it in terms of the zeta integral studied by Jacquet, Piatetski-Shapiro and Shalika. This extends the theory of the Rankin-Selberg integral representation for $GL(n + 1) \times GL(n)$ to all automorphic forms on $GL(n + 1) \times GL(n)$.

This is a joint work with Atushi Ichino.