金沢数論幾何集会

以下の通り研究集会を行います．皆様のご参加をお待ちしております．

日時　２００９年１１月２４日（火）～２７日（金）
場所　石川県文教会館　４０６会議室
〒９２０－０９１８　石川県金沢市尾山町１０番５号
世話人　伊藤哲史（京都大学数学教室）

本研究集会は科学研究費補助金・若手研究(S)「志村多様体を核とした数論幾何学，ガロア表現，保型表現の総合的研究」（課題番号:20674001，研究代表者:伊藤哲史）の一環として行われます．研究集会に関する最新の情報は http://www.math.kyoto-u.ac.jp/~tetsushi/workshop200911/indexj.html をご覧ください．

プログラム

１１月２４日（火）

9:30–10:40　Registration

10:50–12:00　Tetsushi Ito (Kyoto, Math Dept)
On the history of the Sato-Tate conjecture

14:00–15:10　Kai-Wen Lan (Princeton/IAS)
Vanishing theorems for torsion automorphic sheaves

15:40–16:50　Takashi Taniguchi (Kobe)
Survey on Higher composition laws

17:00–18:10　Shushi Harashita (Kobe)
Estimating the Newton polygon of a p-divisible group from its p-kernel

１１月２５日（水）

9:30–10:40　David Geraghty (Harvard)
Automorphy lifting for ordinary Galois representations

10:50–12:00　Yoichi Mieda (Kyushu)
A comparison result in rigid geometry

14:00–15:10　Inna Zakharevich (MIT)
Topological Modular Forms

15:40–16:50　Atsushi Ichino (Osaka City)
Formal degrees and local theta correspondence

17:00–18:10　Tatsuya Ohshita (Kyoto, Math Dept)
Iwasawa theory and higher Fitting ideals

１１月２６日（木）

9:30–10:40 Thomas Barnet-Lamb (Brandeis)

Potential automorphy and the Sato-Tate conjecture for modular forms over $\mathbb{Q}$

10:50–12:00 Toby Gee (Harvard)

The Sato-Tate conjecture for Hilbert modular forms

14:00–15:10 Noriyuki Abe (Tokyo)

On the dimension of Whittaker vectors

15:40–16:50 David Loeffler (Cambridge)

P-adic families of automorphic forms for reductive groups

17:00–18:10 Teruyoshi Yoshida (Cambridge)

TBA

19:00– Banquet at Kanazawa Daimyo Jaya

１１月２７日（金）

9:30–10:40 Naoki Imai (Tokyo)

Compatibility of global and p-adic Langlands correspondences

10:50–12:00 Jonathan Pottharst (Boston College)

A nonordinary control theorem

14:00–15:10 Shu Sasaki (King's College London)

On Artin representations and nearly ordinary Hecke algebras over totally real fields

15:40–16:50 Sug Woo Shin (Chicago)

Plancherel density theorem

17:00– Good bye

アブストラクト

講演者: Noriyuki Abe (Tokyo)

講演題目: On the dimension of Whittaker vectors

アブストラクト: The famous multiplicity one theorem says that the dimensions of the space of non-degenerate Whittaker vectors of an irreducible representation of a quasi-split (real) group is less than or equal to one. In this talk, I will discuss what happens if such conditions (non-degenerate, quasi-split) are not satisfied. I will study Whittaker vectors of parabolic induction and give a formula of the dimension.

講演者: Thomas Barnet-Lamb (Brandeis)

講演題目: Potential automorphy and the Sato-Tate conjecture for modular forms over $\mathbb{Q}$

アブストラクト: I will describe recent joint work with Geraghty, Harris and Taylor in which we make some improvements in the potential automorphy theorems available for Galois representations of any dimension. For ordinary representations, one is now able to prove a moderately general result. For non-ordinary representations, the theorems available are still much more restrictive: but we can prove a result for certain niveau 2 representations with equally spaced Hodge Tate numbers. Together, these results imply the Sato-Tate conjecture for all elliptic modular new forms over the rationals.

講演者: Toby Gee (Harvard)

講演題目: The Sato-Tate conjecture for Hilbert modular forms

アブストラクト: We discuss joint work with Tom Barnet-Lamb and David Geraghty in which we prove the Sato-Tate conjecture for all non-CM regular algebraic cuspidal automorphic representations of GL_2 over an arbitrary totally real field.

講演者: David Geraghty (Harvard)

講演題目: Automorphy lifting for ordinary Galois representations

アブストラクト: I will discuss a generalization of the automorphy lifting theorems of Clozel, Harris and Taylor to the case of ordinary Galois representations. The result is obtained by applying the Taylor-Wiles method (with innovations due to Kisin and Taylor) over a Hida family. A key step is to construct an appropriate ordinary lifting ring and determine its irreducible components.

講演者: Shushi Harashita (Kobe)

講演題目: Estimating the Newton polygon of a p-divisible group from its p-kernel

アブストラクト: In this talk, we give a combinatorial algorithm determining the optimal upper bound of the Newton polygons of p-divisible groups with a given p-kernel type. This can be seen as an unpolarized analogue of Oort's conjecture on the intersections of Newton polygon strata and Ekedahl-Oort strata in the moduli space of principally polarized abelian varieties in positive characteristic.

講演者: Atsushi Ichino (Osaka City)

講演題目: Formal degrees and local theta correspondence

アブストラクト: The formal degree conjecture, which was formulated with K. Hiraga and T. Ikeda, relates a certain representation-theoretic invariant to an arithmetic invariant. It seems hard to prove it but possible to test its functoriality property. We discuss the case of local theta correspondence. This is joint work with Wee Teck Gan.

講演者: Naoki Imai (Tokyo)

講演題目: Compatibility of global and p-adic Langlands correspondences

アブストラクト: In this survey talk, I discuss a compatibility of global and p-adic Langlands correspondences after Breuil and Emerton. Main ingredients are a criterion of local splitness of Galois representations and theory of Jacquet modules. I want to explain how these are used, and a proof of a criterion of local splitness if there is time.

講演者: Tetsushi Ito (Kyoto, Math Dept)

講演題目: On the history of the Sato-Tate conjecture

アブストラクト: This is an expository talk. We will show a number of handwritten letters and numerical tables written by Mikio Sato in the spring of 1963, when he formulated a striking conjecture, nowadays called "the Sato-Tate conjecture", on elliptic curves and Fourier coefficients of modular forms based on computer experiments. We also review how "Non-abelian Class Field Theory", which is a special case of Langlands' functoriality principle, explains the conjecture via analytic properties of symmetric power L-functions. If time permits, we explain what we can and we cannot say about the Sato-Tate conjecture over number fields which are not necessarily totally real.

講演者: Kai-Wen Lan (Princeton/IAS)

講演題目: Vanishing theorems for torsion automorphic sheaves

アブストラクト: Given a compact PEL-type Shimura variety, a sufficiently regular weight (defined by mild effective conditions), and a prime number p unramified in the linear data and larger than an effective bound given by the weight, we show that the etale cohomology with $\mathbb{Z}_p$-coefficients of the given weight vanishes away from the middle degree, and hence has no p-torsion. We do not need any other assumption (such as ones on the images of the associated Galois representations). (This is joint work with Junecue Suh.)

講演者: David Loeffler (Cambridge)

講演題目: P-adic families of automorphic forms for reductive groups

アブストラクト: Coleman's work on overconvergent p-adic modular forms shows that finite slope modular eigenforms can be interpolated p-adically, forming rigid-analytic families of eigenforms parametrised by their weights. This has been generalised by Emerton to cohomological automorphic representations of a wide range of reductive groups, where the local factor at p is principal series. I shall give an exposition of Emerton's construction and of recent work in which I have extended this to certain non-principal-series cases.

講演者: Yoichi Mieda (Kyushu)

講演題目: A comparison result in rigid geometry

アブストラクト: In this talk, I will discuss a comparison result for ℓ-adic cohomology of rigid spaces. First I will give a result for Fujiwara spaces and next explain how we derive from it an analogous result for adic spaces.

講演者: Tatsuya Ohshita (Kyoto, Math Dept)

講演題目: Iwasawa theory and higher Fitting ideals

アブストラクト: Kurihara proved that all the higher Fitting ideals of the minus-part of the Iwasawa modules associated to the cyclotomic $\mathbb{Z}_p$-extention of CM-fields coincide with the higher Stickelberger ideals. In this talk, we study the plus-part of the Iwasawa modules associated to the cyclotomic $\mathbb{Z}_p$-extention of $\mathbb{Q}(\mu_p)$. We define the "higher cyclotomic ideals" C_i, which are ideals of the Iwasawa algebra defined by the Euler system of cyclotomic units, and we prove that they give upper bounds of the higher Fitting ideals. Our result is a refinement of the Iwasawa main conjecture.

講演者: Jonathan Pottharst (Boston College)

講演題目: A nonordinary control theorem

アブストラクト: We present an analogue of Mazur's control theorem for elliptic curves at nonordinary primes, and indicate some applications, such as to Selmer parity and growth.

講演者: Sug Woo Shin (Chicago)

講演題目: Plancherel density theorem

アブストラクト: Let S be a finite set of finite primes. Let G be a connected reductive group over $\mathbb{Q}$ such that $G(\mathbb{R})$ has a discrete series. I prove that the S-components of discrete automorphic representations of $G(\mathbb{A})$ are equidistributed with respect to the Plancherel measure on the unitary dual of $G(\mathbb{Q}_S)$. I'll discuss an application to the existence theorem for automorphic representations.

講演者: Shu Sasaki (King's College London)

講演題目: On Artin representations and nearly ordinary Hecke algebras over totally real fields

アブストラクト: I will explain how to prove an analogue in the "completely split" Hilbert case of a result of Buzzard and Taylor about two-dimensional Artin representations and weight one forms. Time permitting, I will talk about the unramified (inert) case.

講演者: Takashi Taniguchi (Kobe)

講演題目: Survey on Higher composition laws

アブストラクト: In this talk, I will give a survey of Bhargava's famous work "Higher composition laws" and its applications. The theory gives clear insight of integer-orbits structures of certain specific representations, such as the space of pairs of ternary quadratic forms. Many of these are closely related to exceptional groups.

講演者: Inna Zakharevich (MIT)

講演題目: Topological Modular Forms

アブストラクト: Given a generalized cohomology theory we often get a formal group defined by that cohomology theory. In this talk we will attempt to classify formal groups in the image of this functor which also arise as the formal groups of elliptic curves. In the course of doing this we discover a cohomology theory whose values on the even-dimensional spheres are precisely the modular forms (after inverting 6).