Abstract

9:00 – 10:00 **Kentaro Nakamura** (Saga university)

Zeta morphisms for rank two universal deformations.

Abstract. In his work on the Iwasawa main conjecture for elliptic Hecke eigen cusp newforms, Kazuya Kato constructed a map which we call the zeta morphism whose target is the Iwasawa cohomology of the associated p-adic Galois representations. Combining Fukaya-Kato's idea for constructing the zeta morphisms for Hida families with many deep results in the p-adic (local and global) Langlands correspondence for $GL_{2/\mathbb{Q}}$, we extend this map for the universal deformations of odd absolutely irreducible mod p Galois representations of rank two. As an application, we prove a theorem, which roughly says that, under some $\mu = 0$ assumption, the Iwasawa main conjecture (without p-adic L-function) for one modular form implies the same conjecture for arbitrary congruent modular forms.

10:30 – 11:30 **Kenichi Namikawa** (Kyushu University)

A cohomological interpretation of the period integrals for GL(3)×GL(2).

Abstract. The study of periods is fundamental for the arithmetic properties of L-functions, especially constructions of p-adic L-functions. Januszewski constructed p-adic Rankin-Selberg L-functions for GL(n+1)×GL(n), however there are still several properties such as the choice of periods to be improved in his construction according to Coates and Perrin-Riou's conjecture. In this talk, we introduce a refinement of Raghuram-Shahidi's Whittaker periods in GL(3)×GL(2) case, and we give an explicit relation between the periods, certain cohomology classes and critical values of Rankin-Selberg L-functions for GL(3)×GL(2). We also discuss a motivic background of the periods and its application to Januszewski's interpolation formulas. This is a joint work with Takashi Hara.

13:00 – 14:00 **Kazuki Morimoto** (Kobe University)

On Ichino-Ikeda type formula of Bessel period for (SO(5), SO(2)).

Abstract. When SO(2) is non-split, we prove an explicit formula relating Bessel periods for (SO(5), SO(2)) and central L-values (Ichino-Ikeda type formula) for any irreducible tempered cuspidal automorphic representations of SO(5) and SO(2). As an application, we show generalized Böcherer conjecture which is an explicit formula relating certain weighted sums of Fourier coefficients and central L-values. This is a joint work with Masaaki Furusawa(Osaka City University).

14:30 – 15:30 **Hiroshi Noguchi** (Kyoto University)

On genuine characters of the metaplectic group of $SL_2(\mathfrak{o})$ and theta functions.

Abstract. Let F be a totally real number field and $\mathfrak{o}_F$ the ring of integers of F. Feng studied when there exists a theta function which is a half-integral weight Hilbert modular form of $SL_2(\mathfrak{o}_F)$. In the case weight $1/2$, she constructs theta functions. We determine completely when there exists a theta function which is a half-integral weight Hilbert modular form of $SL_2(\mathfrak{o}_F)$. In order to prove this, we determine the genuine characters of the metaplectic group $\widetilde{SL_2(\mathfrak{o})}$, where $\mathfrak{o}$ is the ring of integers of a local field.

16:00 – 17:00 (UTC 7:00 – 8:00) **Toby Gee** (Imperial College London)

Moduli stacks of (ϕ, Γ)-modules.

Abstract. I will review some properties of the moduli stacks of (ϕ, Γ)-modules which I recently constructed with Matthew Emerton, and their connection to the weight part of Serre's conjecture.

Jan. 26 (Tue)

9:00 – 10:00 (EST 19:00 – 20:00, 25 (Mon)) **Chao Li** (Columbia University)

The Beilinson-Bloch conjecture for unitary Shimura varieties.

Abstract: For certain automorphic representations π on unitary groups, we show that if $L(s, \pi)$ vanishes to order one at the center $s = 1/2$, then the associated π-localized Chow group of a unitary Shimura variety is nontrivial. This proves part of the Beilinson-Bloch conjecture for unitary Shimura varieties, which generalizes the BSD conjecture. Assuming the modularity of Kudla's generating series of special cycles, we further prove a precise height formula for $L'(1/2, \pi)$. This proves the conjectural arithmetic inner product formula, which generalizes the Gross-Zagier formula to Shimura varieties of higher dimension. We will motivate these conjectures and discuss some aspects of the proof. This is joint work with Yifeng Liu.

10:30 – 11:30 (PST 17:30 – 18:30, 25 (Mon)) **Ellen Eischen** (University of Oregon)

Spin p-adic L-functions for GSp_6.

Abstract. I will discuss a construction of Spin p-adic L-functions of ordinary cuspidal automorphic representations of GSp_6 associated to Siegel modular forms. This is joint work with G. Rosso and S. Shah.

13:00 – 14:00 **Hirotaka Kakuhama** (Kyoto University)

On the formal degree conjecture for inner forms of Sp_4 and GSp_4.

Abstract: For a square integrable irreducible representation of a reductive group over a local field, Hiraga-Ichino-Ikeda conjectured that the formal degree is described in terms of the Langlands parameter (formal degree conjecture). On the other hand, for inner forms of Sp_4 and GSp_4, the Langlands correspondence is available. More precisely, the Langlands parameter is defined via the theta correspondence with other groups for which the Langlands correspondence has been established. In this talk, I introduce the formal degree conjecture, a result on behavior of the formal degree under theta correspondence, and a result on the formal degree conjecture for inner forms of Sp_4 and GSp_4.

14:30 – 15:30 **Koichi Takase** (Miyagi University of Education)

On supercuspidal representations of Sp_{2n} and Langlands parameters.

Abstract: I will speculate the Langlands parameters of explicitly constructed supercuspidal representations of $Sp_{2n}(F)$ by means of checking -the formal degree conjecture, and -the root number conjecture.

15:30 – 15:40 **On the RIMS workshop and Hakuba for the conference next academic.**

Jan. 27 (Wed)

9:00 – 10:00 (CST 18:00 – 19:00, 26 (Tue)) **Matthew Emerton** (The University of Chicago.)

Moduli stacks of Galois representations.

Abstract: In recent years, the formal deformation theory of Galois representations has been extended in various contexts to a theory of moduli stacks of Galois representations, in which the Galois representations vary in a genuinely algebraic (rather than merely formal) fashion. I will describe some ideas related to moduli stacks of Galois representations, and their relationship to the theory of automorphic forms. The talk will touch upon joint work of the speaker and Toby Gee, and also on work of Xinwen Zhu (some ongoing jointly with the speaker, and some with Gee as well), as well as on the work and ideas of many other mathematicians.

10:30 – 11:30 **Yoichi Mieda** (The University of Tokyo)

Local Saito-Kurokawa A-packets and l-adic cohomology of Rapoport-Zink tower for GSp(4).

Abstract: The Rapoport-Zink tower for GSp(4) is a p-adic local counterpart of the Siegel threefold. Its l-adic cohomology is naturally equipped with actions of three groups: the Weil group of $\mathbb{Q}_p$, $\mathrm{GSp}_4(\mathbb{Q}_p)$, and an inner form $J(\mathbb{Q}_p)$ of $\mathrm{GSp}_4(\mathbb{Q}_p)$. These actions are expected to be strongly related with the local Langlands correspondence, but they are not fully understood yet. In this talk, I will focus on a certain class of non-tempered local A-packets of $J(\mathbb{Q}_p)$, called the Saito-Kurokawa type. Under the assumption that the A-packet contains a supercuspidal representation with trivial central character, I will determine how the A-packet and the associated L-packet contribute to the cohomology of the Rapoport-Zink tower for GSp(4). This is a joint work with Tetsushi Ito.

13:00 – 14:00 **Hiroshi Ishimoto** (Kyoto University)

A proof of Ibukiyama's Shimura type conjecture on Siegel modular forms of half-integral weight and of degree 2.

Abstract: Ibukiyama's Shimura type conjecture asserts that there is a linear isomorphism between "a space of vector valued Siegel cusp forms of degree 2 and of integral weight" and "a plus space of vector valued Siegel cusp forms of degree 2 and of half-integral weight" which preserves L-functions. We can prove this conjecture by using Arthur's multiplicity formula on the split odd special orthogonal group SO_5, Gan-Ichino's multiplicity formula on the metaplectic group Mp_4, and the representation theory of the Jacobi groups.

14:30 – 15:30 (13:30 – 14:30 in Singapore time) **Wee Teck Gan** (National University of Singapore)

Nontempered Restriction Problems for Classical Groups.

Abstract. I will discuss an extension of the Gross-Pasad conjectures to the setting of nontempered A-packets, mention some progress and highlight some subtleties in the nontempered setting. This is joint work with Gross and Prasad.

16:00 – 17:00 (UTC 7:00 – 8:00) **Pol van Hoften** (King's College London)

Mod p points on Shimura varieties of parahoric level.

Abstract. The conjecture of Langlands-Rapoport gives a conjectural description of the mod p points of Shimura varieties, with applications towards computing the (semi-simple) zeta function of these Shimura varieties. The conjecture was proven by Kisin for abelian type Shimura varieties at primes of (hyperspecial) good reduction, after having constructed smooth integral models. For primes of (parahoric) bad reduction, Kisin and Pappas have constructed "good" integral and the conjecture naturally generalises to this setting. In this talk I will discuss recent results towards the conjecture for these integral models, under minor hypothesis, building on earlier work of Zhou. Along the way we will see irreducibility results for various stratifications on special fibers of Shimura varieties, including irreducibility of central leaves and Ekedahl-Oort strata.

Jan. 28 (Thu)

9:00 – 10:00 (PST 16:00 – 17:00, 27 (Wed)) **Aaron Pollack** (University of California, San Diego)

Singular modular forms on exceptional groups.

Abstract: The exceptional group $E_{7,3}$ has a symmetric space with Hermitian tube structure. On it, Henry Kim wrote down low weight holomorphic modular forms that are "singular" in the sense that their Fourier expansion has many terms equal to zero. The symmetric space associated to the exceptional group $E_{8,4}$ does not have a Hermitian structure, but it has what might be the next best thing: a quaternionic structure and associated "modular forms". I will explain the construction of singular modular forms on $E_{8,4}$, and the proof that these special modular forms have rational Fourier expansions, in a precise sense. This builds off of work of Wee Teck Gan and uses key input from Gordan Savin.

10:30 – 11:30 (EST 20:30 – 21:30, 27 (Wed)) **Naomi Tanabe** (Bowdoin College)
Non-vanishing of central values of Rankin-Selberg L-functions.

abstract: It is believed that the central values of modular L-functions are non-vanishing unless there is an arithmetical reason for them to vanish. In this talk, we discuss some results on the non-vanishing of central values of L-functions, with a special focus on that of Rankin-Selberg L-functions attached to (Hilbert) modular forms. Key ingredients in the proof are to establish asymptotics of certain twisted moments. This is a joint work with Alia Hamieh.

13:00 – 14:00 **Yota Maeda** (Kyoto University)
On the Kodaira dimension of unitary Shimura varieties.

Abstract. The Kodaira dimension of Shimura varieties has been studied by many people. Kondo, Gritsenko-Hulek-Sankaran and Ma showed that certain orthogonal Shimura varieties related with the moduli spaces of K3 surfaces are of general type by using the Borcherds lift. On the other hand, Gritsenko-Hulek proved some orthogonal Shimura varieties are uniruled. In this talk, we consider similar problems for unitary Shimura varieties. We give some sufficient conditions for general type or uniruledness of unitary Shimura varieties in terms of Hermitian forms by using the Borcherds form and reflective modular forms. Moreover, we construct Hermitian lattices satisfying the above conditions.

14:30 – 15:30 **Hiraku Atobe** (Hokkaido University)
The Zelevinsky-Aubert duality for classical groups.

Abstract: In 1980, Zelevinsky studied representation theory for p-adic general linear groups. He gave an involution on the set of irreducible representations, which exchanges the trivial representation with the Steinberg representation. Aubert extended this involution to p-adic reductive groups, which is now called the Zelevinsky-Aubert duality. It is expected that this duality preserves the unitarity. In this talk, we explain an algorithm to compute the Zelevinsky-Aubert duality for odd special orthogonal groups or symplectic groups. This is a joint work with Alberto Minguez in University of Vienna.

16:00 – 17:00 (UTC 7:00 – 8:00) **Tobias Berger** (The University of Sheffield)
Eisenstein cohomology and CM congruences.

Abstract. This is a report on joint work in progress with Adel Betina (Vienna) to prove congruences between Eisenstein and cuspidal cohomology classes for imaginary quadratic fields. I plan to discuss applications to $R = T$ theorems and congruences for classical CM modular forms.

9:00 – 10:00 (PST 16:00 – 17:00, 28 (Thu)) **Sug Woo Shin** (University of California, Berkeley)
Cohomology of Igusa varieties.

Abstract. I will review the definition of Igusa varieties in the context of Shimura varieties of Hodge type, and then survey results on the cohomology of Igusa varieties with applications to arithmetic and geometric problems. This includes a recent project with Arno Kret on computing H^0.

10:15 – 11:15 **Masao Oi** (Kyoto University, Hakubi center)
Twisted endoscopic character relation for Kaletha's regular supercuspidal L-packets.

Abstract: Recently Kaletha constructed the local Langlands correspondence (i.e., L-packets and their L-parameters) for a wide class of supercuspidal representations. In this talk, I would like to discuss my ongoing work on the twisted endoscopic character relation for Kaletha's supercuspidal L-packets. The strategy is to imitate Kaletha's proof of the standard endoscopic character relation in the setting of twisted endoscopy. Thus first I am going to review Kaletha's construction of supercuspidal L-packets and his proof of the standard endoscopic character relation. Then I will explain a few key points in the twisting process with an emphasis on Waldspurger's philosophy "l'endoscopie tordue n'est pas si tordue".

11:30 – 12:30 **Ken-ichi Yoshikawa** (Kyoto University)
Quasi-pullback of certain Siegel modular forms and Borcherds products.

Abstract: A holomorphic torsion invariant of K3 surfaces with involution was introduced by myself, and it has been proved by S. Ma and me that this invariant is expressed as the product of an explicit Borcherds product and an explicit Siegel modular form. In this talk, I will report that these automorphic forms are closed under the operation called the quasi-pullback. As a result, we obtain some Borcherds products as the quasi-pullback of (the pullback via the Torelli map of) the Siegel modular form defined as the product of all even theta constants.