

研究集会「保型形式と数論」

世話人 市野 篤史 (京都大学)・山名 俊介 (大阪公立大学)

日時： 2023年1月11日(水)～1月13日(金)

場所： 京都大学 数学教室 3号館110号室

京都市左京区北白川追分町

アブストラクト集

1月11日(水)

9:40 - 9:45 開会の辞

9:45 - 10:45 平賀 郁 (京都大学)

Title: Endoscopy for covering groups of anisotropic inner forms of $GL(2)$

Abstract: Langlands functoriality for covering groups of quasi-split reductive groups has advanced in recent years. On the other hand, little is known about Langlands functoriality for covering groups of reductive groups that are not quasi-split. In this talk, I will explain the endoscopy for covering groups of even degree of anisotropic inner forms of $GL(2)$. This is a joint work with T.Ikeda.

11:00 - 12:00 古澤 昌秋 (大阪公立大学)

Title: On a certain Ichino-Ikeda type formula and the generalized Böcherer conjecture

Abstract: (Joint work with Kazuki Morimoto)

We discuss the Ichino-Ikeda type formula for the Bessel periods in the case of $(SO(5), SO(2))$. As a corollary of our formula, we obtain an explicit formula relating certain weighted averages of Fourier coefficients of holomorphic Siegel cusp forms of degree two which are Hecke eigenforms to central special values of L-functions. The formula is regarded as a natural generalization of Böcherer's conjecture to the non-trivial torus character case.

題目:ある市野-池田型公式と一般化されたベッヘラー予想について

概要:(森本和輝(神戸大学)との共同研究)

$(SO(5), SO(2))$ の場合の市野-池田型公式について述べる. 公式の系として, ヘッケ固有形式である次数2のジューゲル尖点形式のフーリエ係数のある有限和とL-関数の中心特殊値の間の明示公式が得られる. この公式は, ベッヘラー予想のトーラス指標が非自明な場合への自然な一般化とみなせる.

13:30 - 14:30 千田 雅隆 (東京電機大学)

Title: Arithmetic diagonal cycles on Kuga-Sato varieties

Abstract: In this talk, we will discuss the construction of algebraic cycles on Kuga-Sato varieties over unitary Shimura varieties. A variant of the arithmetic Gan-Gross-Prasad conjecture was proposed by Rapoport-Smithling-Zhang, which is a conjectural generalization of the Gross-Zagier formula. We will formulate an analogue of the conjecture for higher weight cases.

14:45 - 15:45 Ming-Lun Hsieh (National Taiwan University)

Title: p-adic L-functions for $U(3) \times U(2)$ and the Ichino-Ikeda conjecture

Abstract: In this talk, I will talk about the p-adic interpolation of Gross-Prasad periods in the setting of $U(3) \times U(2)$. Thanks to the Ichino-Ikeda conjecture established by R. Beuzart-Plessis-Y. Liu-W. Zhang-X. Zhu in the stable case and R. Beuzart-Plessis-Chaudouard-Zydor in the endoscopic case, this leads to a construction of the five variable p-adic L-functions associated with Hida families for $U(3) \times U(2)$. This is a joint work in progress with M. Harris and S. Yamana.

16:00 - 17:00 広瀬 稔 (名古屋大学)

Title: Euler sums and cyclotomic associators

Abstract: Euler sums are real numbers defined by iterated integrals on the projective line minus $0, \infty, 1, -1$. In this talk, we introduce a family of linear relations among Euler sums which exhausts all motivic linear relations. This gives an explicit description of the level two motivic Galois group. We also show that the level two motivic Galois group coincides with the cyclotomic Grothendieck-Teichmüller group introduced by Benjamin Enriquez. Some part of this talk is based on a joint work with Nobuo Sato.

1月12日 (木)

9:45 - 10:45 Sungmun Cho (POSTECH)

Title: Orbital integrals for gl_n and smoothening

Abstract: In this talk, we will introduce a new method of analyzing the orbital integral for a regular semisimple element and for the unit element of the Hecke algebra in gl_n defined over any local field of characteristic 0 or $> n$, using smoothening of a certain scheme defined over DVR. As an application, we will provide a closed formula for $n = 2, 3$ and a lower bound for any $n > 3$. We will also propose a conjecture about estimation of a “potential” formula for gl_n . This is a joint work with Yuchan Lee.

11:00 - 12:00 今野 拓也 (九州大学)

Title: On the Satake isomorphism

Abstract: We present a representation theoretic proof of the well-known Satake’s isomorphism for unramified Hecke algebra. The key ingredients are an extension of Borel’s description of modules over affine Hecke algebras, and the structure theorem for the Bernstein center.

13:30 - 14:30 松本 久義 (東京大学)

Title: Gevrey completion of a Whittaker module over sl_2 (joint work with Y. Yamaguchi)

Abstract: Goodman and Wallach constructed Whittaker vectors in the Gevrey completion of Verma modules. Such vectors can be regarded as differential operators of infinite order from principal series representations to Whittaker models. In this talk, we construct highest weight vectors in the Gevrey completion of a Whittaker module over sl_2 . They give the inverse of the Goodman-Wallach operators.

概要: Goodman-Wallach は Verma 加群の Gevrey 完備化において Whittaker ベクトルを構成した。これは主系列表現から Whittaker モデルへの無限階微分作用素とみなされる。この講演では sl_2 の Whittaker 加群の Gevrey 完備化において最大ウエイトベクトルを構成する。これは Goodman-Wallach 作用素の逆写像を与える。

14:45 - 15:45 桂田 英典 (北海道大学・室蘭工業大学)

Title: Congruence between certain lifts and Harder’s conjecture

Abstract: 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 $S_{\det^k \otimes \text{Sym}^j}(Sp_2(\mathbb{Z}))$ modulo some prime ideal. 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 several conjectures on the congruence between the Klinegen-Eisenstein lift of the Duke-Imamoglu-Ikeda lift or of the Miyawaki lift and a certain lift of a Hecke eigenform in $S_{\det^k \otimes \text{Sym}^j}(Sp_2(\mathbb{Z}))$. These conjectures imply Harder's conjecture. In particular, we prove our conjecture, and therefore Harder's in the case that k is even and $j \equiv 0 \pmod{4}$. We also talk about our ongoing project for other cases. Some part of this talk is based on a joint work with H. Atobe, M. Chida, T. Ibukiyama and T. Yamauchi.

16:00 - 17:00 池田 保 (京都大学)

Title: On the theory of the liftings

Abstract: This is an expository talk on the theory of the liftings. I will explain the theory of the Duke-Imamoglu-Ibukiyama lifting and the Miyawaki lifting and related topics. I will also explain how these lifting can be understood in terms of the Arthur endoscopic classification.

17:30 - 池田先生の還暦をお祝いする会 (飲食の提供なし)

1月13日 (金)

9:45 - 10:45 堀永 周司 (日本電信電話株式会社)

Title: Cuspidal components of Siegel modular forms for large discrete series representations of $Sp_4(\mathbb{R})$

Abstract: As far as I know, there are no known results of an explicit description of cuspidal components for non-holomorphic automorphic forms except for nearly holomorphic modular forms. In this talk, we investigate the cuspidal components and the structures for automorphic forms on Sp_4 which generate large discrete series representations by the explicit formulas of degenerate Whittaker functions of large discrete series representations. This talk is based on the joint work with Hiro-aki Narita.

概要: 非正則な保型形式の尖点成分の研究は、概正則保型形式を除いて十分に進展しているとは言い難い。本講演では、 Sp_4 上の large discrete series representation を生成する保型形式の尖点成分やそのなす構造を、large discrete series representation の退化ホイットカー関数の明示式を通じて考察する。本講演の内容は成田氏との共同研究に準ずる。

11:00 - 12:00 Alberto Minguez (University of Vienna)

Title: Local Transfer for quasi-split classical groups and congruences mod ℓ

Abstract: Let π and π' be two ℓ -adic irreducible cuspidal representations of a quasi-split classical group G and let σ and σ' be their respective Langlands's transfers to $GL(N)$. Assume π and π' are integral and denote $r_\ell(\pi)$ and $r_\ell(\pi')$ their reduction modulo ℓ . We will show that, if $r_\ell(\pi) \leq r_\ell(\pi')$, then $r_\ell(\sigma)$ and $r_\ell(\sigma')$ have a unique generic irreducible component in common. This is joint work with Vincent Sécherre.

13:30 - 14:30 鈴木 美裕 (京都大学)

Title: Towards the full epsilon dichotomy for linear periods

Abstract: Let G be an inner form of $GL(n)$ over a local field F and H be its symmetric subgroup which is an inner form of $GL(m)$ over a quadratic extension of F . An H -invariant linear form on a representation of G is called a linear period. Prasad and Takloo-Bighash formulated a conjecture about necessary conditions for representations of G to be distinguished. In this talk, I will reformulate their conjecture so that it characterizes distinguished representations in generic L-packets in terms of epsilon factors and the characters of the S-groups. I will also explain that this reformulated epsilon dichotomy follows from the conjectural multiplicity formula, which is proposed by Chen Wan for general spherical varieties.

14:45 - 15:45 若槻 聡 (金沢大学)

Title: Twisted limit multiplicity formulas for $GL(n)$

Abstract: In this talk, I will discuss our ongoing research on twisted limit multiplicity formulas for $GL(n)$. First, I give a summary on (non-twisted) limit multiplicity formulas, which have been already proved for a wide class of reductive groups. Next, I introduce twisted limit multiplicity formulas for $GL(n)$ with respect to symplectic, orthogonal, and unitary involutions, and present a conjecture on the measures of limits of multiplicities for the unitary involution. This conjecture is based on some results in the paper of Hiraga-Ichino-Ikeda on the formal degree conjecture. This is a joint work with Miyu Suzuki and Yugo Takanashi.

16:00 - 17:00 雪江 明彦 (京都大学)

Title: On density theorems and rational orbits related to prehomogeneous vector spaces

Abstract: After reviewing the interpretation of rational orbits of generic points, we discuss recent density theorems related to prehomogeneous vector spaces. Then we explain examples of the GIT stratification which describes rational orbits of points where the action is bad.

題目: 概均質ベクトル空間に関する密度定理と有理軌道について

概要: 概均質ベクトル空間の一般点の有理軌道について復習した後、概均質ベクトル空間に関する密度定理に関する最近の結果について解説し、作用が悪い部分の有理軌道に関する GIT stratification の例について解説する。

17:00 閉会の辞