上智数論ミニ集会
(Number theory mini-workshop at Sophia)

日程： ２０１９年１月３０日から１月３１日
場所： 上智大学市ヶ谷キャンパス本館２０１教室

この集会は平成３０年度科学研究費基盤研究（C）課題番号 15K04795 の助成を受けています。(集会世話人：都築正男)

プログラム

30, January

13: 30 – 14: 30 Shingo Sugiyama (Nihon University)
Integrality of Hecke eigenvalues for Hilbert and Siegel modular forms

14:45 – 15: 45 Ade Irma Suriajaya (Riken)
An upper bound for Stieltjes constants of L-functions in the Selberg class

16: 00 – 17 :00 Soma Purkait (Tokyo Institute of Technology)
Local Hecke algebra and minus space

Dinner (18: 00 –)

31, January

10:00 – 11:00 Yosuke Irie (Kyushu University)
Hyperbolic Eisenstein Series on n-dimensional Hyperbolic Spaces

11: 15 – 12: 15 Keiju Sono (Ehime University)
Moments and non-vanishing of quadratic L-functions

Lunch (12 :15 – 14: 00)

14: 00 – 15 : 00 Niko Laaksonen (Alfred Renyi Institute of Mathematics)
Prime Geodesic Theorem in the three-dimensional hyperbolic space

15:15 – 16 :15 Eren Mehmet Kiral (Sophia University)
Heisenberg group and the Lerch zeta function

講演のアブストラクト

- Shingo Sugiyama

  TITLE：Integrality of Hecke eigenvalues for Hilbert and Siegel modular forms

  ABSTRACT: It is well-known that Hecke eigenvalues of elliptic modular forms are algebraic integers. Integrality of Hecke eigenvalues is given for Hilbert modular forms of parallel weight with general level by Shimura, and for scalar-valued Siegel modular forms of full level by Kurokawa and Mizumoto. With the aid of Kai-Wen Lan's work on automorphic forms on PEL Shimura varieties, we give integrality of Hecke eigenvalues for general Hilbert and Siegel modular forms. In particular, since our method does not need cohomological properties, integrality of Hecke eigenvalues follows for non-cohomological automorphic forms. As an application of integrality, we give also an infinitude of cohomological cusp forms on $GL(2p)$ with a prime number p so that the absolute degrees of the fields of rationality go to infinity. This is a joint work with Kenji Sakugawa (Kyoto University).

- Ade Irma Suriajaya

  TITLE: An upper bound for Stieltjes constants of L-functions in the Selberg class

  ABSTRACT: In this talk we are interested in the coefficients of the Laurent expansion of zeta functions and L-functions near $s = 1$. Such coefficients for the Riemann zeta function were first studied by Stieltjes in 1885 followed by many authors in the following centuries, such as Briggs, Mitrovič, Matsuoka, and Saad Eddin. For this reason, these coefficients are widely known as "Stieltjes constants". An explicit upper bound for the Stieltjes constants of Dirichlet L-functions is also known. It was further used to determine zero-free regions for $L(s, \chi)$ near the real axis in the critical strip $0 \leq \Re(s) \leq 1$. We are interested in investigating the Stieltjes constants for L-functions in the Selberg class. This class is *expected* to be the largest class of zeta functions and L-functions satisfying the Riemann hypothesis, usually called the Grand Riemann Hypothesis: all nontrivial zeros of these functions lie on $\Re(s) = 1/2$. This is a joint work with Shōta Inoue (Nagoya University) and Sumaia Saad Eddin (JKU Linz).

- Soma Purkait

  TITLE : Local Hecke algebra and minus space

  ABSTRACT: We compute generators and relations for a certain 2-adic Hecke algebra of level 8 associated with the double cover of SL_2 and a 2-adic Hecke algebra of level 4 associated with PGL_2. We show that these two Hecke algebras are isomorphic as expected from the Shimura correspondence. We use the 2-adic generators to define classical Hecke operators on the space of cuspidal modular forms of weight $k+1/2$ and level $8M$ where M is odd and square-free. Using these operators we define a subspace of the space of half-integral weight forms as a common -1 eigenspace of certain pairs of conjugate Hecke operators and show that this subspace is isomorphic as a Hecke module to the space of new forms of weight $2k$ and level $4M$. We observe that the forms in the minus space satisfy a Fourier coefficient condition that gives the complement of the plus space but does not define the minus space.

- Yosuke Irie

  TITLE : Hyperbolic Eisenstein Series on n-dimensional Hyperbolic Spaces

  ABSTRACT: The hyperbolic Eisenstein series is the non-holomorphic Eisenstein series associated to hyperbolic fixed points, or equivalently a primitive hyperbolic element of Fuchsian groups of the first kind. It was first introduced by S. S. Kudla and J. J. Millson in 1979 as an analogue of the ordinary Eisenstein series associated to a parabolic fixed point. In this talk, we introduce the hyperbolic Eisenstein series on n-dimensional hyperbolic spaces and its fundamental properties. We also give the the precise spectral expansion associated to the Laplace-Beltrami operator and the analytic continuation with the location of the possible poles and their residues.

- Keiju Sono

  TITLE: Moments and non-vanishing of quadratic L-functions

  ABSTRACT: Evaluation of the moments of L-functions is one of the fundamental problems in analytic number theory. In this talk, we give an asymptotic formula for the second moment of primitive quadratic L-functions near the central point. In particular, we see how the combinatorial method proposed by M.P.Young works in the case of second moment.

- Niko Laaksonen

  TITLE: Prime Geodesic Theorem in the three-dimensional hyperbolic space

  ABSTRACT : The Prime Geodesic Theorem (PGT) states that the lengths of primitive closed geodesics on a hyperbolic surface have an asymptotic behaviour analogous to the usual prime numbers. Through an explicit formula for the Selberg zeta function we can relate the error term to certain spectral exponential sums. In the past few years there has been a renewed interest in this problem especially in two and three dimensions. In this talk we will outline some recent progress on the pointwise and second moment bounds of the error term in the PGT on various three dimensional hyperbolic manifolds.

- Eren Mehmet Kiral

  TITLE : Heisenberg group and the Lerch zeta function

  ABSTRACT: I want to talk about a recent paper of Jeffrey Lagarias with the above title. Representations of the Heisenberg group give rise to Lerch zeta and Lerch L-functions, and Fourier duality, which is intrinsic to the Heisenberg group itself, gives rise to the Functional equation of these Lerch zeta or L-functions.