上智数論ミニ集会 2020
(Number theory mini-workshop at Sophia)

日程： 2020 年 3 月 31 日 から 4 月 1 日
場所： 上智大学四谷キャンパス４号館 3 階 ４－３９８

プログラム

31, March

13: 30 – 14: 30 Tadashi Miyazaki (Kitasato University),
Archimedean Rankin-Selberg integrals for compatible pairs of principal series representations.

14:45 – 15: 45 Toshiki Matsusaka (Kyushu University),
Trinity of the Eisenstein series.

16: 00 – 17 :00 Hirotaka Akatsuka (Otaru University of Commerce),
Maximal orders of divisor functions.

Dinner (18: 00 –)

1, April

10:00 – 11:00 Seiji Kuga (Kyushu University),
On the zeros of certain weakly holomorphic modular forms.

11: 15 – 12: 15 Masahiro Mine (Tokyo Institute of Technology),
Automorphic L-functions and the associated random Euler products.

Lunch (12 :15 – 14: 00)

14: 00 – 15 : 00 **Colloquium talk**
Gautami Bhowmik (Lille University),
Non-vanishing of L-functions

15:15 – 16 :15 Hiro-aki Narita (Waseda University)
TBA

講演のアブストラクト

- Tadashi Miyazaki (Kitasato University)

  TITLE: Archimedean Rankin-Selberg integrals for compatible pairs of principal series representations.

  ABSTRACT：In this talk, we consider archimedean Rankin-Selberg integrals for a pair (Π, Π') of principal series representations of $GL(n)$ and $GL(n')$ $(n - n' = 0, 1)$. Eric Stade show that, if Π and Π' are both spherical, the associated L-factor can be expressed as an archimedean Rankin-Selberg integral defined by the spherical Whittaker functions. As an generalization of his result, we show that, if Π and Π' satisfy some compatible condition, the associated L-factor can be expressed as an archimedean Rankin-Selberg integral defined by some minimal K- and K'-type Whittaker functions. This is a joint work with Taku Ishii.

- Toshiki Matsusaka (Kyushu University)

  TITLE: Trinity of the Eisenstein series

  ABSTRACT: About a decade ago, Kaneko introduced an invariant $\mathrm{val}(w)$ for real quadratics as an analogue of singular moduli $j(z)$ for imaginary quadratics. For the Faber polynomials $j_n(z)$, it is known that the generating function of $\mathrm{val}_n(w)$ is close to a modular form of weight 2, and shares a similar property with the Eisenstein series E_2. Based on Rademacher's and Ghys' works on E_2, Duke-Imamoglu-Toth (2017) introduced the real quadratic analogue of the Rademacher symbol to study the linking numbers of modular links. In this talk, we give some properties of this new object. Moreover, the limit formulas for three types of the Eisenstein series bring new perspective to them.

- Hirotaka Akatsuka (Otaru University of Commerce)

  TITLE: Maximal orders of divisor functions

  ABSTRACT: In 1915 Ramanujan investigated the maximal size of the divisor function $d(n)$ systematically. He also studied the maximal size of other arithmetic functions. However the latter study was removed from the paper at that time. In this talk we revisit the maximal size of $\sigma_\kappa(n) = \sum_{d|n} d^\kappa$ for fixed real κ. In particular we explain the relation between its maximal size and zeros of the Riemann zeta-function.

- Seiji Kuga (Kyushu University)

  TITLE: On the zeros of certain weakly holomorphic modular forms

  ABSTRACT: A weakly holomorphic modular form is like a modular form which is allowed to have poles at cusps.

  It is well known that all the zeros of the Eisenstein series for $SL_2(\mathbb{Z})$ on the standard fundamental domain lie on the lower boundary arc. It was proved by F. K. C. Rankin and H. P. F. Swinnerton-Dyer. Moreover, W. Kohnen proved that they are transcendental except for i and $\frac{-1+\sqrt{3}i}{2}$.

  In this talk, we consider the locations and transcendency of the zeros of certain weakly holomorphic modular forms for the Fricke groups. This is a joint work with Seiichi Hanamoto (Kyushu University).

- Masahiro Mine (Tokyo Institute of Technology)

  TITLE: Automorphic L-functions and the associated random Euler products

  ABSTRACT: The idea of comparing L-functions with adequate random models brought the recent progress in the theory of the value-distributions of L-functions. Upper bounds for the differences between their distributions are called the discrepancy bounds for L-functions.

  The discrepancy bound for the Riemann zeta-function was firstly obtained by Matsumoto, and significantly improved by Lamzouri–Lester–Radziwiłł.

  In this talk, we study the value-distribution of L-functions of holomorphic newforms as the newforms are varying.

  Then we obtain a discrepancy bound for such automorphic L-functions by applying Eichler–Selberg's or Petersson's trace formula.

- (Colloquium talk) Gautami Bhowmik (Lille University)

  TITLE : Non-vanishing of L-functions

  ABSTRACT: Among the analytic properties of L-functions, we are interested in their mean values called moments and in knowing whether a positive proportion of families of these functions vanish at a central point. We will explain some methods used in this study. In particular we will treat mixed moments of the product of Hecke L-functions and symmetric square L-functions associated to primitive cusp forms.

- Hiro-aki Narita (Waseda University)
  TBA