

Miniworkshop on “Arithmetic of L -functions”

Organizers: Masataka Chida (Tokyo Denki University)
Kenichi Namikawa (Tokyo Denki University)
Tadashi Ochiai (Institute of Science Tokyo)

Date: June 1 (Mon.) - June 2 (Tue.) 2026

Venu: Room 201, Main building, Ookayama campus, Department of Mathematics,
Institute of Science Tokyo

June 1 (Mon.)

- 10:00 – 11:00 **Shinichi Kobayashi** (Kyushu University)
 p -adic aspects of the coefficients of the Weierstrass sigma function at supersingular primes
- 11:30 – 12:30 **Shunsuke Yamana** (Osaka Metropolitan University)
Towards a p -adic Gross-Zagier formula for $U(2, 1) \times U(1, 1)$
- 14:00 – 15:00 **Kenichi Namikawa** (Tokyo Denki University)
Regulators of Fermat curves via Rankin-Selberg method
- 15:30 – 16:30 **Tadashi Ochiai** (Institute of Science Tokyo)
Theory of multi-variable admissible distributions and its applications to the construction of multi-variable non-ordinary p -adic L -functions

June 2 (Tue.)

- 10:00 – 11:00 **Ryotaro Sakamoto** (Tsukuba University)
On the structure of Euler systems and its applications
- 11:30 – 12:30 **Takamichi Sano** (Osaka Metropolitan University)
On derivatives of p -adic L -functions for motives
- 14:00 – 15:00 **Tetsushi Ito** (Kyoto University)
Modularity of elliptic curves over cyclotomic $\mathbb{Z}_p$ -extensions of certain totally real abelian fields
- 15:30 – 16:30 **Ming-Lun Hsieh** (National Taiwan University)
Yoshida congruence and Selmer groups

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June 1 (Mon.)

10:00 – 11:00 **Shinichi Kobayashi** (Kyushu University)

Title: p -adic aspects of the coefficients of the Weierstrass sigma function at supersingular primes

Abstract: The coefficients of the Weierstrass sigma function are interesting objects related to special values of Eisenstein series. In particular, for CM elliptic curves, their squares express special values of the L -function associated with the anticyclotomic deformation of the corresponding Hecke character. Thus, their p -adic properties are closely related to the existence of p -adic L -functions. When p is ordinary, the p -adic properties of these coefficients have long been understood. In the supersingular case, the speaker, together with Kenichi Bannai and Seidai Yasuda, previously determined lower bounds for the p -adic valuations of the coefficients and the radius of convergence. Motivated by recent developments concerning Iwasawa theory for CM elliptic curves at inert primes, the speaker has obtained more refined estimates and congruence relations, which form the main topic of this talk. Time permitting, the speaker will also discuss a supercongruence among special values of Eisenstein series at supersingular points obtained in connection with this problem.

11:30 – 12:30 **Shunsuke Yamana** (Osaka Metropolitan University)

Title: Towards a p -adic Gross-Zagier formula for $U(2, 1) \times U(1, 1)$

Abstract: I will discuss the construction of the p -adic L -function for $U(2, 1) \times U(1, 1)$ with emphasis on a theta operator for $U(2, 1)$, which plays a role analogous to the classical Ramanujan-Serre theta operator in Hida’s p -adic Rankin-Selberg method for $GL(2) \times GL(2)$ and $GL(2) \times GL(2) \times GL(2)$. If time permits, I will also discuss a future application to the p -adic Gross-Zagier formula for $U(2, 1) \times U(1, 1)$. This is a joint work with Ming-Lun Hsieh, Michael Harris, Masataka Chida, and others.

14:00 – 15:00 **Kenichi Namikawa** (Tokyo Denki University)

Title: Regulators of Fermat curves via Rankin-Selberg method

Abstract: In this talk, I will discuss the calculation of the regulators of Fermat curves via the Rankin-Selberg method. One of the key points of the study is the use of a distinguished uniformization of Fermat curves by the Poincaré upper half plane. By using this uniformization, we study a variant of Ross elements and distinguished Eisenstein series attached to them. Then the calculation of the regulator is reduced to that of the Rankin-Selberg integrals. As a result, we prove Beilinson’s conjecture for the quartic Fermat curve. This is a joint work with Kenji Sakugawa.

15:30 – 16:30 **Tadashi Ochiai** (Institute of Science Tokyo)

Title: Theory of multi-variable admissible distributions and its applications to the construction of multi-variable non-ordinary p -adic L -functions

Abstract: First, we recall the construction of one-variable p -adic L -functions in the ordinary case and in the non-ordinary case. In the non-ordinary one-variable case, the theory of admissible distributions of logarithmic order developed by Amice-Velu was essential to construct and characterize the p -adic L -function for a given non-ordinary motive. Thanks to the development of the theory of

p -adic deformations, the p -adic L -function can be considered in multivariable situations by considering p -adic deformation of motives. If we consider nearly ordinary deformations, we already have a lot of examples of multivariable p -adic L -functions associated with Hida deformations. However, if we want to construct and characterize the p -adic L -functions for non ordinary multivariable p -adic deformation spaces, we need a multi-variable variant of the theory of Amice-Velu. We developed such a theory and we constructed an example of multivariable nonordinary p -adic L -function associated with a two-variable p -adic family of non-ordinary automorphic representations as an application of our theory. I will report on this work. This is a joint work with Kengo Fukunaga.

June 2 (Tue.)

10:00 – 11:00 **Ryotaro Sakamoto** (Tsukuba University)

Title: On the structure of Euler systems and its applications

Abstract: Euler systems are among the most powerful tools for connecting Selmer groups with L -functions, and several examples of Euler systems have been constructed in recent years. In this talk, we discuss recent progress on the structure of the module of Euler systems. If time permits, we will also discuss applications to the Tate modules of elliptic curves. This is joint work with Masato Kurihara.

11:30 – 12:30 **Takamichi Sano** (Osaka Metropolitan University)

Title: On derivatives of p -adic L -functions for motives

Abstract: We formulate a conjecture on derivatives of p -adic L -functions for motives, which generalizes the conjectures of Mazur–Tate–Teitelbaum, Bernardi–Goldstein–Stephens, Bertolini–Darmon, and Agboola–Castella. We study its relation with the Iwasawa main conjecture and give an application to the Tamagawa number conjecture of Bloch–Kato.

14:00 – 15:00 **Tetsushi Ito** (Kyoto University)

Title: Modularity of elliptic curves over cyclotomic $\mathbb{Z}_p$ -extensions of certain totally real abelian fields

Abstract: Thorne proved the modularity of elliptic curves over the cyclotomic $\mathbb{Z}_p$ -extension of $\mathbb{Q}$. Recently, X. Zhang and Yoshikawa generalized Thorne’s results to real quadratic fields, under certain mod p non-vanishing assumptions on twisted L -values. In this talk, we further generalize their results to totally real abelian fields, under similar mod p non-vanishing assumptions. A key ingredient is the rank stability of elliptic curves over cyclotomic $\mathbb{Z}_p$ -extensions; we prove it using techniques from Iwasawa theory at ordinary and supersingular primes, following Kato and Kurihara. This talk is based on a joint work with Masataka Chida (Tokyo Denki University) and Sho Yoshikawa (Tokyo University of Science).

15:30 – 16:30 **Ming-Lun Hsieh** (National Taiwan University)

Title: Yoshida congruence and Selmer groups

Abstract: I will talk about the construction of non-trivial Selmer classes for Rankin-Selberg convolution via the congruence between Yoshida lifts and stable forms on $\mathrm{GSp}(4)$. This talk is based on a joint work with Bharathwaj Palvannan.