丘成桐数学科学中心
YAU MATHEMATICAL SCIENCES CENTER

TSIMF
清华三亚国际数学论坛

L - 函数的特殊值

SPECIAL VALUES OF L-FUNCTIONS

JANUARY 2-6, 2024

组织者 ORGANIZERS:

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报告人 SPEAKERS:

Francesc Castella
Murilo Corato Zanarella
Yangyu Fan
Olivier Fouquet
Wei He
Yukako Kezuka
Chan-Ho Kim
Jungwon Lee
Yong-Xiong Li
Jun-Hwi Min
Hae-Sang Sun
Jun Wang
Dong Yan
Robin Zhang

Shcedule for "Special values of L-functions"
Janurary 2 - 6, 2024

Time&Date	Tuesday(Jan 2)	Wednesday(Jan 3)
Breakfast 7:30-8:30		
9:00-10:00		Francesc Castella
Chair		Wan Xin
Coffee break 10:00-10:30		
10:30-11:30		Jun Wang
Chair		Wan Xin
Lunch 12:00-13:30		
14:00-15:00	Wei He	Hae-Sang Sun
Chair	Emmanuel Lecouturier	Kentaro Nakamura
Coffee break 15:00-15:30		
15:30-16:30	Yong-Xiong Li	Jungwon Lee
Chair	Emmanuel Lecouturier	Kentaro Nakamura
17:30	Dinner	

Shcedule for "Special values of L-functions"
Janurary 2 - 6, 2024

Time&Date	Thursday(Jan 4)	Friday(Jan 5)	Saturday(Jan 6)
Breakfast 7:30-8:30			
9:00-10:00	Olivier Fouquet	Murilo Corato Zanarella	Dong Yan
Chair	Francesc Castella	Hae-Sang Sun	Olivier Fouquet
	Group Photo	Coffee break 10:00-10:30	
10:30-11:30	Chan-Ho Kim	Jun-Hwi Min	Yangyu Fan
Chair	Francesc Castella	Hae-Sang Sun	Olivier Fouquet
Lunch 12:00-13:30			
14:00-15:00	Robin Zhang	Nanshan Temple （南山寺）	Yalong Bay Tropical Paradise Forest Park （亚龙湾 热带天堂森林公园）
Chair	Chan-Ho Kim		
Coffee break 15:00-15:30			
15:30-16:30	Yukako Kezuka		
Chair	Chan-Ho Kim		
17:30	Banquet	Dinner	

Titles and Abstracts

Periods formulae for theta lifting from SO(3) to SL(2)

Wei He

In this talk, we will introduce several periods formulae for the theta lifting from SO(3) to metaplectic SL(2). Then, we will introduce some arithmetic applications to quadratic twist family of elliptic curves. This is joint work with Prof. Ye Tian and Prof. Wei Xiong.

Quadratic twists of elliptic curves and applications

Yong-Xiong Li

In this talk, we review various methods and results in the study on L-values of quadratic twists of elliptic curves. Then we give several applications to arithmetic problems.

Mazur's main conjecture at Eisenstein primes

Francesc Castella

In this talk, I will describe the main ingredients in the recent proof (joint with Giada Grossi and Chris Skinner) of Mazur's main conjecture for elliptic curves at Eisenstein primes under a mild hypothesis. If time permits, I will also discuss work aimed at extending this result.

On the arithmetic of special values for Eisenstein modular abelian varieties

Jun Wang

Let N and p be primes ≥ 5 such that $p \mid\mid N - 1$. In this situation, Mazur defined and studied the p-Eisenstein quotient $\tilde{J}^{(p)}$ of $J_0(N)$. I will talk about a modulo p version of the Birch and Swinnerton-Dyer conjecture for the "p-Eisenstein part" of even quadratic twists of $\tilde{J}^{(p)}$, which is an analogue of a result of Mazur concerning odd quadratic twists. This is joint work with Emmanuel Lecouturier.

Second moment of modular symbols

Hae-Sang Sun

Mazur-Rubin conjecture presents precise form of the variance of modular symbols over the rationals with a fixed denominator. An average version is proved by Petridis-Risager and the original version for prime denominators is proved by Blomer-Fouvry-Kowalski-Michel-Milicevic-Sawin. In the talk, I will introduce how to use the theory of continued fractions to study the conjecture. This is ongoing research joint with Hong Kwon.

Ergodic proof of an equidistribution result of Ferrero-Washington

Jungwon Lee

We sketch and reprove the main equidistribution instance in the Ferrero-Washington proof of the vanishing of Iwasawa mu-invariant, based on the ergodicity of a certain p-adic skew-product extension dynamical system that can be identified with Bernoulli shift (joint with Bharathwaj Palvannan).

Variations on Iwasawa Main Conjectures with coefficients in Hecke algebras for modular motives

Olivier Fouquet

The generalized Iwasawa Main Conjectures of Kato predict the variation of special values of L-functions in p-adic families of modular motives. I will outline a proof of them under favorable hypotheses assuming they hold for the cyclotomic deformation and explain as a consequence the the proof of some new equivariant refinement special value formulae for the L-function of an eigencuspform (including an equivariant action by a p-group, a case which is considered harder).

Ceci n'est pas la conjecture de Birch et Swinnerton-Dyer

Chan-Ho Kim

Let f be a cuspidal newform with trivial nebentypus and p be an odd prime such that the associated p-adic Galois representation has large image. We present another refined special L-value formula for the Bloch-Kato Selmer group of the central critical twist of f only under a small part of the Iwasawa main conjecture. Our formula is insensitive to weight, the analytic rank, and the local automorphic behavior of f at p. As consequences, we obtain the non-vanishing of Kato's Kolyvagin system and complete a "discrete" analogue of the Beilinson–Bloch–Kato conjecture for modular forms at ordinary primes. Numerical examples will be provided.

Harris–Venkatesh plus Stark

Robin Zhang

The class number formula describes the behavior of the Dedekind zeta function at s = 0. The Stark conjecture extends the class number formula, describing the behavior of Artin L-functions at s = 0 in terms of units. The Harris–Venkatesh conjecture serves as the first verifiable part of the broader conjectures of Venkatesh and Prasanna–Venkatesh, describes the residue of Stark units modulo p, and gives a modular analogue to the Stark conjecture. In this talk, I will draw an introductory picture, formulate a unified conjecture combining Harris–Venkatesh and Stark for modular forms of weight 1, and describe the proof of this in the imaginary dihedral case. Time permitting, I will also describe some new questions and in-progress work modulo p^n.

Generalised Euler characteristics of Selmer groups for non-CM elliptic curves

Yukako Kezuka

We consider an elliptic curve E which does not admit complex multiplication, and discuss its arithmetic over the cyclotomic $\mathbf{Z}_p$-extension and more general p-adic Lie extensions of various base fields F . After reviewing some known results over number fields, we shift our focus to the case of global function fields. In this context, we introduce an invariant which is defined without assuming the finiteness of the Selmer group of E over the base field F .

First explicit reciprocity law for unitary Fridberg–Jacquet periods

Murilo Corato Zanarella

In the early 2000's, Bertolini and Darmon introduced a new technique to bound Selmer groups of elliptic curves via level raising congruences. This was the first example of what is now termed a "bipartite Euler system", and over the last decade we have seen many breakthroughs on constructing such systems for other Galois representations, including settings such as twisted and cubic triple product, symmetric cube, and Rankin– Selberg, with applications to the Bloch–Kato conjecture and to Iwasawa theory.

For this talk, I'll consider Galois representations attached to automorphic forms on a totally definite unitary group $U(2r)$ over a CM field which are distinguished by the subgroup $U(r) \times U(r)$. I'll discuss a new "first explicit reciprocity law" in this setting and its application to the corre-sponding Bloch–Kato conjecture, focusing on new obstacles which arise from the lack of local multiplicity one.

Generation of Hecke fields by products of modular L-values with cyclotomic twists

Jun-Hwi Min

Let f and g be non-CM newforms. For an odd prime p, we let χ denote a Dirichlet character with p-power conductor and order. Thanks to the work of Shimura, it is known that there exist algebraic central modular L-values $L_f(\chi)$ and $L_g(\chi)$. We prove that the Hecke field $\mathbf{Q}_f \mathbf{Q}_g(\chi)$ is generated by the product $L_f(\chi)L_g(\chi)$. The main idea of this talk is inspired by the works of Blomer-Milicevic [The second moment of twisted modular L-functions(2015)] and Sun [Generation of Cyclotomic Hecke Fields by Modular L-Values with Cyclotomic Twists(2019)]. This is a joint work with Ashay Burungale.

Control theorem of Selmer groups for residually reducible Hida families at Eisenstein intersection points

Dong Yan

To study Iwasawa theory for residually reducible Galois deformations, one of subtle points in this case is that the lattice is not unique up to homothety and properties of Selmer group may depend on the choice of lattice. In this talk, we give a result on control theorem of Selmer groups for every lattice in a two-variable residually reducible Hida family, especially at Eisenstein intersection points which do not exist in the residually irreducible case. Then by specialization, this result enables us to know the precise statement of the main conjecture in more general cases as we will remark in the talk.

Overconvergence of CM forms

Yangyu Fan

In this talk, we will discuss the overconvergence of the infinite slope p-adic family of theta series, which comes from a p-adic family of Hecke characters on an imaginary quadratic field in which p is non-split. If time permits, we will also explain applications to the construction of p-adic Rankin series.
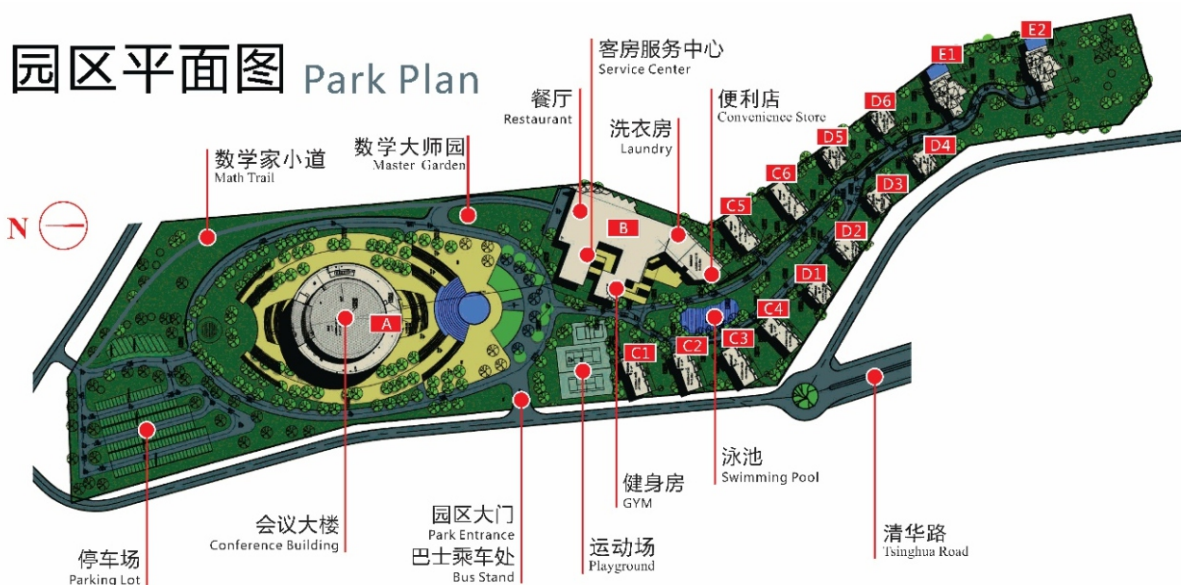
Welcome to TSIMF

The facilities of TSIMF are built on a 23-acre land surrounded by pristine environment at Phoenix Hill of Phoenix Township. The total square footage of all the facilities is over 29,000 square meter that includes state-of-the-art conference facilities (over 10,000 square meter) to hold many international workshops simultaneously, two reading rooms of library, a guest house (over 10,000 square meter) and the associated catering facilities, a large swimming pool, gym and sports court and other recreational facilities.

Management Center of Tsinghua Sanya International Forum is responsible for the construction, operation, management and service of TSIMF. The mission of TSIMF is to become a base for scientific innovations, and for nurturing of innovative human resource; through the interaction between leading mathematicians and core research groups in pure mathematics, applied mathematics, statistics, theoretical physics, applied physics, theoretical biology and other relating disciplines, TSIMF will provide a platform for exploring new directions, developing new methods, nurturing mathematical talents, and working to raise the level of mathematical research in China.

About Facilities

园区平面图 Park Plan

数学家小道 Math Trail
数学大师园 Master Garden
餐厅 Restaurant
客房服务中心 Service Center
洗衣房 Laundry
便利店 Convenience Store
N
B
A
停车场 Parking Lot
会议大楼 Conference Building
园区大门 Park Entrance
巴士乘车处 Bus Stand
运动场 Playground
健身房 GYM
泳池 Swimming Pool
清华路 Tsinghua Road
C1 C2 C3 C4 C5 C6
D1 D2 D3 D4 D5 D6
E1 E2

Registration

Conference booklets, room keys and name badges for all participants will be distributed at the front desk. Please take good care of your name badge. It is also your meal card and entrance ticket for all events.

Guest Room
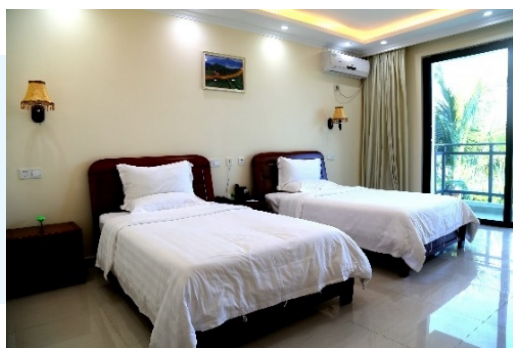
All the rooms are equipped with: free Wi-Fi(Password:tsimf123), TV, air conditioning and other utilities.

Family rooms are also equipped with kitchen and refrigerator.

Library

Opening Hours: 09:00am-22:00pm

TSIMF library is available during the conference and can be accessed by using your room card. There is no need to sign out books but we ask that you kindly return any borrowed books to the book cart in library before your departure.

In order to give readers a better understanding of the contributions made by the Fields Medalists, the library of Tsinghua Sanya International Mathematics Forum (TSIMF) instituted the Special Collection of Fields Medalists as permanent collection of the library to serve the mathematical researchers and readers.

So far, there are 234 books from 47 authors in the Special Collection of Fields Medalists of TSIMF library. They are on display in room A220. The participants are welcome to visit.
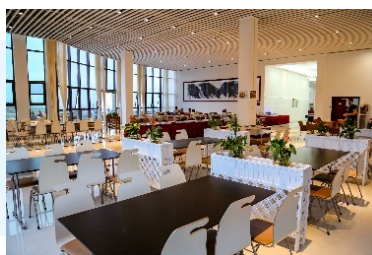
Restaurant

All the meals are provided in the restaurant (Building B1) according to the time schedule.

Breakfast   **07:30-08:30**
Lunch   **12:00-13:30**
Dinner   **17:30-19:00**

Laundry

Opening Hours: 24 hours

The self-service laundry room is located in the Building 1 (B1).

Gym

The gym is located in the Building 1 (B1), opposite to the reception hall. The gym provides various fitness equipment, as well as pool tables, tennis tables etc.

Playground

Playground is located on the east of the central gate. There you can play basketball, tennis and badminton. Meanwhile, you can borrow table tennis, basketball, tennis balls and badminton at the reception desk.

Swimming Pool

Please note that there are no lifeguards. We will not be responsible for any accidents or injuries. In case of any injury or any other emergency, please call the reception hall at +86-898-38882828.

Free Shuttle Bus Service at TSIMF

We provide free shuttle bus for participants and you are always welcome to take our shuttle bus, all you need to do is wave your hands to stop the bus.

Destinations: Conference Building, Reception Room, Restaurant, Swimming Pool, Hotel etc.

电瓶车路线图 Shuttle Bus Route

Contact Information of Administration Staff

Location of Conference Affairs Office: Room 104, Building A
Tel: 0086-898-38263896

Conference Manager: Shouxi He 何守喜
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