2024 Chen Jing-Run Prize Conference

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Sponsors:

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首届"陈景润奖"评奖委员会

主任:

张寿武 普林斯顿大学教授,美国人文与科学院院士。

委员:

Henri Darmon 加拿大麦吉尔大学教授,加拿大皇家学会会士。曾获美国 Cole 奖(2017)。

Hélène Esnault 德国柏林自由大学教授,欧洲科学院院士,德国科学院院士。 曾获德国莱布尼兹奖(2003),德国康托奖章(2019)。

Dorian Goldfeld 哥伦比亚大学教授,美国人文与科学院院士。曾获美国 Cole 奖 (1987)。

János Kollár 普林斯顿大学教授,美国科学院院士,美国人文与科学院院士。 曾获美国 Cole 奖(2006),邵逸夫奖(2017)。ICM2014 大会报告人。

George Lusztig 麻省理工学院教授,美国科学院院士,美国人文与科学院院士。 曾获美国 Cole 奖(1985),邵逸夫奖(2014),沃尔夫奖(2022)。ICM1990 大会报告人。

Bảo Châu Ngô 芝加哥大学教授,美国人文与科学院院士,法国科学院外籍院士。2010年获菲尔兹奖。ICM2010大会报告人。

Award Committee of the first Chen Jing-Run Prize

Chair:

Shou-Wu Zhang Professor at Princeton University, Member of American Academy of Arts and Sciences.

Members:

Henri Darmon Professor at McGill University, Member of the Royal Society of Canada. Awarded Cole Prize (2017).

Hélène Esnault Professor at Free University of Berlin, Member of Academia Europaea, Member of Academy Leopoldina. Awarded Leibniz Prize (2003) and Cantor Medal (2019).

Dorian Goldfeld Professor at Columbia University, Member of American Academy of Arts and Sciences. Awarded Cole Prize (1987).

János Kollár Professor at Princeton University, Member of National Academy of Sciences, Member of American Academy of Arts and Sciences. Awarded Cole Prize (2006), Shaw Prize (2017). ICM2014 Plenary Speaker.

George Lusztig Professor at MIT, Member of National Academy of Sciences, Member of American Academy of Arts and Sciences. Awarded Cole Prize (1985), Shaw Prize (2014), Wolf Prize (2022). ICM1990 Plenary Speaker.

Bảo Châu Ngô Professor at the University of Chicago, Member of American Academy of Arts and Sciences, Foreign Member of Academie des Sciences de Paris. Awarded Fields Medal (2010). ICM2010 Plenary Speaker.

第一届陈景润奖获奖成果

获奖成果一

成果名称	L-函数的矩及其在 Rankin-Selberg 问题和算术量子混沌中的应用		
成果介绍	L-函数,包括黎曼 ζ 函数,是解析数论的主要研究对象之一。L-函数矩的估计是数论的核心难题,在自守形式和量子混沌等领域有着重要的应用。 Rankin-Selberg 问题旨在改进 Rankin 和 Selberg 于 1939/1940 证明的自守形式傅里叶系数的二次均值的余项。该成果于 2021 年首次突破了这个长期存在的屏障,得到了亚凸性的指数。证明的核心是将问题转化成 L-函数的矩,并与三阶 L-函数的亚凸界问题相关联,从而利用 delta 方法解决问题。算术量子混沌研究具有算术结构的混沌系统,算术双曲面是主要模型之一。其 Laplace 算子的特征函数,即 Maass 形式,在半经典极限的值分		
	布是主要研究问题之一,包括随机波猜想和量子波动猜想。该成果利用 L-函数矩的估计,解决了 Hecke-Maass 形式的三阶矩问题和 Eisenstein 级数的量子方差问题。相比于量子唯一遍历性(即二阶矩),该成果得到了三阶矩的量化上界。		
	获奖成果相关主要论著:		
成果相关 论著	 Bingrong Huang, Quantum variance for Eisenstein series, International Mathematics Research Notices, Volume 2021, Number 2, 1224-1248. Bingrong Huang, On the Rankin-Selberg problem, Mathematische Annalen, Volume 381, 1217-1251, 2021. 		
	3) Bingrong Huang, The cubic moment of Hecke-Maass cusp forms and moments of L-functions, Mathematische Annalen, Volume 389, 899-945, 2024.		
成果完成。	人情况		
姓名	黄炳荣		
出生年月	1990年1月		
工作单位	山东大学数据科学研究院		
研究领域	解析数论		
电话	0531-88369786		
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颁奖词	陈景润奖授予黄炳荣,以表彰他在 Selberg 卷积和量子混沌研究中取得的重大进展。 Rankin-Selberg 卷积是一种从两个旧的 <i>L</i> -函数构造新 <i>L</i> -函数的重要方法。它也是研究朗兰兹纲领最强有力的方法之一。量子混沌研究的是量子力学如何趋近经典力学。		

黄炳荣首先在模形式傅里叶系数的平方截断到N的部分和的余项大小方面取得了令人惊讶且显著的进展。Rankin 和 Selberg 在 80 多年前的著名论文中,独立找到了上界 $O(N^{3/5})$ 。许多人尝试改进这个上界,但都未成功。在这 80 年来,黄炳荣首次成功改进了这个上界!

利用相同的技术,黄炳荣在量子混沌的两个问题上也取得了重要进展。

第一个问题是理解混沌量子系统中可观测量的矩阵系数的波动。黄炳荣首次解决了 Eisenstein 级数的量子方差问题。此前,罗文智和 Peter Sarnak(1995)解决了尖形式的这个问题。

第二个问题涉及特征函数的值分布, 黄炳荣证明了 Hecke-Maass 尖形式的光滑三阶矩的多项式衰减。这类问题源于 Michael Berry(1977)的建议, 即混沌系统的特征函数由随机波模型化。

总的来说,黄教授近期的工作对解析数论和量子混沌领域产生了深远的影响。

获奖成果二

成果名称	仿射 Deligne-Lusztig 簇的不可约分支		
成果介绍	仿射 Deligne-Lusztig 簇是志村簇约化的群论模型,在算术几何和朗兰兹纲领中扮演着重要的角色。仿射 Deligne-Lusztig 簇不可约分支的分类问题是一个基本的公开问题,在志村簇上的 Tate 猜想等重要课题中有着关键的应用。为了解决这一难题,陈苗芬和朱歆文提出了一个著名的猜想:不可约分支的轨道集与 Weyl 模的特定权空间的晶体基之间存在典则的一一对应。通过构造不可约分支上的晶体结构,该成果给出了陈-朱猜想的完整证明,并得到了计算不可约分支稳定子群的组合算法,原则上解决了不可约分支的分类问题。		
成果相关论著	获奖成果相关主要论著: 1) Sian Nie, Irreducible components of affine Deligne-Lusztig varieties, Cambridge Journal of Mathematics, Volume 10, Number 2, 433-510, 2022. 获奖成果相关其他论著: 1) Ulrich Görtz; Xuhua He; Sian Nie, Fully Hodge-Newton decomposable Shimura varieties, Peking Mathematical Journal, Number 2, 99-154, 2019. 2) Sian Nie, Connected components of closed affine Deligne-Lusztig varieties in affine Grassmannians, American Journal of Mathematics, Volume 140, Number 5, 1357-1397, 2018. 3) Xuhua He; Sian Nie, On the μ-ordinary locus of a Shimura variety, Advances in Mathematics, Volume 321, 513-528, 2017. 4) Ulrich Görtz; Xuhua He; Sian Nie, P-alcoves and nonemptiness of affine Deligne-Lusztig varieties, Annales scientifiques de l'École normale supérieure, Volume 48, 647-665, 2015.		
成果完成	人情况		
姓名	聂思安		
出生年月	1984年8月		
工作单位	中国科学院数学与系统科学研究院		
研究领域	代数群、表示论与算数几何		
电话	010-82541997		
电子邮箱	niesian@amss.ac.cn		
颁奖词	陈景润奖授予聂思安,以表彰他对于仿射 Deligne-Lusztig 簇研究的重大贡献。仿射 Deligne-Lusztig 簇是算术几何与李理论中的重要对象。它为志村簇的约化提供了一个群论模型,在数论和朗兰兹纲领中发挥着重要的作用。		
200000	首先,聂思安、Görtz 和何旭华证明了 Görtz,Haines,Kottwitz 和 Reuman 提出的一个猜想。从而建立了仿射旗簇中,基本元素的仿射 Deligne-Luszti g 簇的非空模式。该结果代表了仿射旗簇情形下非空模式的最著名的结果。 随后聂思安解决了陈苗芬-朱歆文猜想,这一猜想预言了仿射 Deligne-Lusztig 簇的不		

可被用于研究特殊闭链和 Tate 猜想。

最后,聂思安、Görtz 和何旭华引入了完全 Hodge-Newton 可分解条件的概念。他们证明了,属于该家族的仿射 Deligne-Lusztig 簇(以及相关的志村簇簇)具有非常好的几何结构。这种几何结构已被用于研究某些志村簇的 Kudla-Rapoport 纲领和 Tate 猜想。

除了上述的重大贡献外, 聂思安还在仿射 Deligne-Lusztig 簇的连通分支方面取得了重要进展。

总而言之, 聂思安的近期工作对算术几何和李理论领域产生了深远的影响。

Awarded Works of the First Chen Jing-Run Prize

Awarded Work 1

Title	Moments of L -Functions and their applications to the Rankin-Selberg problem and arithmetic quantum chaos		
	L-functions, including the Riemann zeta function, are one of the main research objects in analytic number theory. The estimation of moments of L -functions is a central problem in number theory and has important applications in automorphic forms, quantum chaos, etc.		
Introduction	The Rankin-Selberg problem is about improving the error term of the second moment of the Fourier coefficients of a GL(2) automorphic form proved by Rankin and Selberg in 1939/1940. This awarded work breaks this long-standing barrier for the first time in 2021 and proves a subconvexity exponent. The core of the proof is to transform the problem into moments of <i>L</i> -functions and connect it to the subconvexity problem of degree 3 <i>L</i> -functions, so as to solve the problem using the delta method.		
	Arithmetic quantum chaos studies chaotic systems with arithmetic structure, and arithmetic hyperbolic surfaces are one of the main models. The value distribution of eigenfunctions of its Laplace operator, namely Maass forms, in the semiclassical limit is one of the main research problems, including the random wave conjecture and the quantum fluctuation conjecture. This awarded work uses the estimation of moments of <i>L</i> -functions to solve the cubic moment problem of the Hecke-Maass forms and the quantum variance problem of the Eisenstein series. Compared with the quantum unique ergodicity (i.e., the second moment), this result obtains quantitative upper bounds in the cubic moments case.		
Related Publications	1) Bingrong Huang, Quantum variance for Eisenstein series, International Mathematics Research Notices, Volume 2021, Number 2, 1224-1248. 2) Bingrong Huang, On the Rankin–Selberg problem, Mathematische Annalen, Volume 381, 1217-1251, 2021. 3) Bingrong Huang, The cubic moment of Hecke–Maass cusp forms and moments of <i>L</i> -functions, Mathematische Annalen, Volume 389, 899-945, 2024.		
Authors of th	ne Awarded Work		
Name	Bingrong Huang		
Date of Birth	January 1990		
Affiliation	Data Science Institute, Shandong University		
Research Field	Analytic Number Theory		
Telephone	0531-88369786		
Email	brhuang@sdu.edu.cn		

The Chen Jing-Run Prize is awarded to Bingrong Huang for his substantial progress in the studies of Selberg convolutions and quantum chaos.

Rankin-Selberg convolution is an important method for constructing new *L*-from two old *L*-functions. It is also one of the most powerful methods for studying the Langlands program. Quantum chaos is a study of how quantum mechanics approaches classical mechanics.

Huang first made surprising and remarkable progress on the size of the remainder term in partial sums up to N of the squares of Fourier coefficients of modular forms. Rankin and Selberg, in a famous paper, independently found the bound of $O(N^{3/5})$ over 80 years ago. Many people tried unsuccessfully to get a better bound. Huang succeeded in improving this bound for the first time in 80 years!

With these same techniques, Huang made important progress on two problems in quantum chaos.

The first is to understand the fluctuations of matrix coefficients of observables in chaotic quantum systems. Huang solves this problem for the first time in the case of quantum variance for the Eisenstein series. Wenzhi Luo and Peter Sarnak (1995) previously solved this problem for cusp forms.

The second problem concerns the value distribution of eigenfunctions, where Huang proves the polynomial decay for smooth cubic moments of Hecke-Maass cusp forms for the modular group. This type of problem arose from Michael Berry's suggestion (1977) that eigenfunctions for chaotic systems are modeled by random waves.

Overall, Prof. Huang's recent work has had a profound impact on the field of analytic number theory and quantum chaos.

Citation

Awarded Work 2

Title	Irreducible components of affine Deligne-Lusztig varieties		
Affine Deligne-Lusztig varieties are group-theoretic models for reduction Shimura varieties, and play an important role in arithmetic geometry and I program. The classification of their irreducible components is a fundament problem, which has essential applications in various important topics such as conjecture of Shimura varieties. To solve it, Miaofen Chen and Xinwen Zhu problem correspondence with certain crystal basis of the Weyl module. By constructing structure on the irreducible components, this awarded work completely so conjecture of Chen and Zhu. Moreover, this awarded work obtained an algorized compute the stabilizer of each irreducible component. This in principle so classification problem of irreducible components of affine Deligne-Lusztig varies.			
Main Papers of the awarded work: 1) Sian Nie, Irreducible components of affine Deligne-Lusztig varieties, Camb Journal of Mathematics, Volume 10, Number 2, 433-510, 2022. Other papers of the awarded work: 1) Ulrich Görtz; Xuhua He; Sian Nie, Fully Hodge-Newton decomposable Sh varieties, Peking Mathematical Journal, Number 2, 99-154, 2019. 2) Ling Chen; Sian Nie, Connected components of closed affine Deligne-Luszties, Mathematische Annalen, Volume 375, 1355-1392, 2019. 3) Sian Nie, Connected components of closed affine Deligne-Lusztig varieties Grassmannians, American Journal of Mathematics, Volume 140, Number 5, 1 2018. 4) Xuhua He; Sian Nie, On the μ-ordinary locus of a Shimura variety, Advance Mathematics, Volume 321, 513-528, 2017. 5) Ulrich Görtz; Xuhua He; Sian Nie, P-alcoves and nonemptiness of affine D Lusztig varieties, Annales scientifiques de l'École normale supérieure, Volume			
Authors of th	ne Awarded Work		
Name	Sian Nie		
Date of Birth	August 1984		
Affiliation	Academy of Mathematics and Systems Science, Chinese Academy of Sciences		
Research Field	Algebraic groups, representation theory and arithmetic geometry		
Telephone	010-82541997		
Email	niesian@amss.ac.cn		
Citation	The Chen Jing-Run Prize is awarded to Sian Nie for his substantial contributions to		

the study of the affine Deligne-Lusztig varieties. Affine Deligne-Lusztig variety is an important object in arithmetic geometry and Lie theory. It provides a group-theoretic model for the reduction of Shimura varieties and plays a significant role in number theory and the Langlands program.

First, Nie, Görtz and He verified a conjecture proposed by Görtz, Haines, Kottwitz, and Reuman. They established the nonemptiness pattern for the affine Deligne-Lusztig varieties in the affine flag for the basic elements. This result represents the best-known outcome on the nonemptiness pattern in the affine flag case.

Then Nie resolved the Chen-Zhu conjecture, predicting a natural bijection between the irreducible components of the affine Deligne-Lusztig variety and the Mirkovic-Vilonen cycles in certain weight spaces of the highest weight representations. This conjecture has applications in studying special cycles and the Tate conjecture.

Finally, Nie, Gortz and He introduced the notion of a fully Hodge-Newton decomposable condition. They showed that the affine Deligne-Lusztig varieties (and the associated Shimura varieties) belonging to this family possess a remarkably nice geometric structure. This geometric structure has been used in studying the Kudla-Rapoport program and the Tate conjecture for certain Shimura varieties.

In addition to these significant contributions, Nie has also made important advancements in the connected components of affine Deligne-Lusztig varieties.

Overall, Prof. Nie's recent work has had a profound impact on the field of arithmetic geometry and Lie theory.

"陈景润奖"奖励条例

Chen Jing-Run Prize Regulations

- 第一条 为奖励和表彰在数论与代数方向做出的杰出成果,特设立"陈景润奖"。后续将根据颁奖情况考虑发展为国际奖项。
- Article 1. Chen Jing-Run Prize is set up to reward and recognize an outstanding research work in number theory and/or an outstanding research work in algebra, and is possibly developed into an international prize in the future.
- 第二条 中国科学院数学与系统科学研究院、中国科学院大学教育基金会是 "陈景润奖"的主办单位。
- Article 2. The Academy of Mathematics and Systems Science of the Chinese Academy of Sciences and the University of Chinese Academy of Sciences Education Foundation are the organizers of the Chen Jing-Run Prize.
- 第三条 本奖奖励在中国内地(大陆)、香港、澳门、台湾完成的数论与代数方向的杰出成果。完成者国籍不限,颁奖年度当年1月1日均须未满40周岁。本奖以发现新人为主要目的,不再奖励已获得过国内外重大奖励的相关完成人。
- Article 3. The prize is awarded for an outstanding research work in number theory and/or for an outstanding research work in algebra completed in Mainland China, Hong Kong, Macao, and Taiwan. A recipient's 40th birthday must not occur before January 1st 31 of the award year. As the purpose of the prize is to recognize budding talents in mathematics, individuals who have won major prizes at home or abroad will not be considered for the prize.
- 第四条 本奖每两年颁发一次,每次最多两项成果,每项成果奖励金额人民币 20 万元整,同时颁发获奖证书。
- Article 4. The biennial prize is given to no more than two research works each time. The researcher(s) of each selected work will be awarded 200,000 Chinese yuan with a certificate.
- 第五条 "陈景润奖"评选工作由评奖委员会负责,评奖委员会由主办单位邀请7位国内外著名专家学者组成。其中主任委员1位,数论与代数方向各3位委员。评奖委员会每届任期两年,每位委员最多可连续任三届。主办单位设立评奖委员会秘书处负责评选过程中的事务性工作。
- Article 5. The research works for the Chen Jing-Run Prize are selected by the Award Committee composed of 7 renowned domestic and international experts, of whom 1 is the chair member, 3 committee members are number theorists and the other 3 committee members are algebraists. The tenure of the committee chairman and each member is two years with a maximum of three consecutive terms. The Secretariat is set up by the organizers to undertake the administrative work in selection.

第六条 本奖候选成果由推荐方式产生,两名或以上同行专家可联名推荐候选成果。评奖委员会委员不得作为推荐人。

Article 6. A candidate research work should be nominated by at least two peer experts. Members of the Award Committee are excluded from nominating.

第七条 评奖委员会委员完成的成果在任期内不得参选。

Article 7. The work of the members of the Award Committee are excluded from being nominated during their tenure.

第八条 自当届评选通告发布之日始,三个月内征集推荐材料。推荐材料由推荐人提供,包括候选成果详细的学术成就及影响,以及相关完成人的情况。

Article 8. Nomination materials shall be solicited within three months from the date when the announcement is published. Materials of a nomination consist of a letter of nomination, a complete bibliographic citation for the work being nominated, and a brief citation that explains why the work is important.

第九条 在征得拟授奖对象的同意后, 拟授奖名单将向社会公示。

Article 9. List of proposed recipients will be made public upon the consent of the awardees.

第十条"陈景润奖"的奖金由中国科学院大学教育基金会专项提供,"陈景润奖"的评奖活动和颁奖活动由中国科学院数学与系统科学研究院组织。

Article 10. The prize is sponsored by the University of Chinese Academy of Sciences Education Foundation and the evaluation and prize-giving ceremony shall be hosted by the Academy of Mathematics and Systems Science of the Chinese Academy of Sciences.

第十一条 本条例自发布之日起生效。本条例解释权属于中国科学院数学与系统科学研究院、中国科学院大学教育基金会。

Article 11. The regulations take effect from the date of publication. The right to interpret these regulations belongs to the Academy of Mathematics and Systems Science of the Chinese Academy of Sciences and the University of Chinese Academy of Sciences Education Foundation.

中国科学院数学与系统科学研究院 中国科学院大学教育基金会 2022 年 10 月 24 日

Academy of Mathematics and Systems Science of Chinese Academy of Sciences University of Chinese Academy of Sciences Education Foundation
October 24, 2022

"陈景润奖"评选办法

Evaluation Regulations of Chen Jing-Run Prize

"陈景润奖"由中国科学院数学与系统科学研究院、中国科学院大学教育基金会作为主办单位设立。为保障"陈景润奖"评选的学术性、公正性和社会影响力,现制定"陈景润奖"评选办法。

The Chen Jing-Run Prize is set up by the Academy of Mathematics and Systems Science of the Chinese Academy of Sciences and the University of Chinese Academy of Sciences Education Foundation. To ensure its academic nature and fairness and expand its social impact the following regulations are formulated.

一、评奖范围

"陈景润奖"旨在奖励和表彰在中国内地(大陆)、香港、澳门、台湾完成的数论与代数方向的杰出成果。其完成者国籍不限,颁奖年度当年1月1日均须未满40周岁。本奖以发现新人为主要目的,不再奖励已获得过国内外重大奖励的相关完成人。

I. Candidates Eligible for the Prize

Chen Jing-Run Prize is awarded for an outstanding research work in number theory and/or for an outstanding research work in algebra completed in Mainland China, Hong Kong, Macao, and Taiwan. A recipient's 40th birthday must not occur before January 1st 31 of the award year. As the purpose of the prize is to recognize budding talents in mathematics, individuals who have won major prizes at home or abroad will not be eligible.

二、评奖委员会组成

"陈景润奖"评选工作由评奖委员会负责。评奖委员会由主办单位邀请七位国内外著名专家学者组成。其中主任委员 1 位,负责评奖过程的组织协调工作;数论与代数方向各 3 位委员。

评奖委员会每届任期两年,每位委员最多可连续任三届。主办单位设立评 奖委员会秘书处负责评选过程中的事务性工作。

II. Composition of Award Committee

The research works for the Chen Jing-Run Prize are selected by the Award Committee composed of 7 renowned scholars worldwide, of whom 1 is the chair member, 3 committee members are number theorists and the other 3 committee members are algebraists. The tenure of the committee chairman and each member is two years with a maximum of three consecutive terms. The Secretariat is set up by the organizers to undertake the administrative work in selection.

三、征集推荐材料

评选每两年组织一次。自当届评选通告发布之日始,三个月内征集推荐材料。

两名或以上同行专家可联名推荐候选成果。同行专家应为科研院所、高校的研究员、教授或同等资历人员。评奖委员会委员在任期内不得作为推荐人,其 完成的成果在任期内也不得参选。

推荐材料由推荐人提供,包括候选成果详细的学术成就及影响,以及相关完成人的情况。

III. Nomination Materials

The Prize is given biennially. Nomination materials shall be solicited within three months from the date when the announcement is published.

A candidate research work should be nominated by at least two peer experts, who are professors, research fellows, or equally qualified professionals from universities and research institutes. Members of the Award Committee are excluded from nominating and their research works are excluded from being nominated during their tenure.

Materials of a nomination consist of a letter of nomination, a complete bibliographic citation for the work being nominated, and a brief citation that explains why the work is important.

四、组织评选

评选方式可采用通讯评议和现场或线上会评相结合的方式,由评委会主任 委员酌情决定。

现场或线上会评必须有三分之二以上(不含三分之二)委员参加方能举行。如采用现场会评,特殊情况下,不能到场的委员可以以视频方式参会。委员有充分表达意见的权利。候选成果须获得参会委员三分之二以上(含三分之二)同意方可获奖。

每次评选最多两项获奖成果。

IV. Selection

The award selection adopts a hybrid mode, with a combination of communication evaluation and on-site or online evaluation, at the discretion of the Chairman of the Award Committee.

On-site or online evaluation can only be held with the participation of more than two-thirds of the members. In the case of an on-site meeting, members who cannot be present may participate via online. Members have the right to fully express their opinions. A research work is eligible for the prize with the consent of at least two-thirds of the members.

The biennial award is given to no more than two research works each time.

五、社会公示

在征得拟授奖对象的同意后,拟授奖名单将向社会公示。公示期不少于 7 天。

V. Announcement

List of proposed recipients will be made public for at least 7 days upon the consent of the awardees.

六、颁奖

本奖每两年颁发一次,中国科学院数学与系统科学研究院负责颁奖活动的 具体组织,在中国科学院数学与系统科学研究院组织的数论与代数学术会议上颁 发,奖金由中国科学院大学教育基金会专项提供。每项成果奖励金额人民币 20 万元整,同时颁发获奖证书。

VI. Awarding

The biennial prize-giving ceremony is hold at the Conference in Number Theory and Algebra hosted by the Academy of Mathematics and Systems Science of the Chinese Academy of Sciences. The researcher(s) of each selected work will be awarded 200,000 Chinese yuan totally sponsored by the University of Chinese Academy of Sciences Education Foundation and a certificate.

七、其他

本办法解释权属于中国科学院数学与系统科学研究院、中国科学院大学教育基金会。

VII. Others

The right to interpret the regulations belongs to the Academy of Mathematics and Systems Science of the Chinese Academy of Sciences and the University of Chinese Academy of Sciences Education Foundation.

中国科学院数学与系统科学研究院 中国科学院大学教育基金会 2022 年 10 月 24 日

Academy of Mathematics and Systems Science of Chinese Academy of Sciences
University of Chinese Academy of Sciences Education Foundation
October 24, 2022

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The conference "2024 Chen Jing-Run Prize Conference" will be held at **Morningside** Center of Mathematics, which was founded by Chinese Academy of Sciences in 1996 and **Professor Shing-Tung Yau** has been serving as the director of the center.

Registration Date & Location:

July 29th, 2024, 8:30-9:00, Lecture Hall of Siyuan Building

Address: No. 55, Zhongguancun East Road, Haidian District, Beijing

地址: 北京市海淀区中关村东路 55 号

Conference Time: July 29-July 31, 2024

Conference Venue: Lecture Hall of Siyuan Building & MCM Building 110

Address: No. 55, Zhongguancun East Road, Haidian District, Beijing

地址: 北京市海淀区中关村东路 55 号

Website:

http://www.mcm.ac.cn/events/programs/202404/t20240425_776035.html

QR code of the conference:



Contact: Manlin Wang (王曼琳) Email: mcmoffice@math.ac.cn

WeChat QR code:



Lunch: Speakers and participants can have lunch on the 3rd floor of Wuke Restaurant by meal tickets during the conference.

Conference Staff:

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Transportation:

There are two airports in Beijing, the Beijing Capital International Airport (about 33 km to AMSS and the hotel) and the Beijing Daxing International Airport (about 65 km to AMSS and the hotel).

From Beijing Capital International Airport (北京首都国际机场) to Liaoning International Hotel (辽宁大厦) and Wuke Hotel (物科宾馆)

- 1. Subway: take the Airport Express to Sanyuanqiao (三元桥) and then transfer to the subway line 10 to Zhichunlu (知春路) or Zhichunli (知春里) Station which costs about 30 Yuan from airport.
- 2. Taxi: take a taxi to Liaoning International Hotel (辽宁大厦) /the Wuke Hotel (物科宾馆) which costs about 100 Yuan and it takes about one hour depending on the traffic condition.

More details:

https://en.bcia.com.cn/dtjcx.html https://www.bjsubway.com/en/

From Beijing Daxing International Airport (北京大兴国际机场) to Liaoning International Hotel (辽宁大厦) and Wuke Hotel (物科宾馆)

1. Subway: take the Daxing Airport Express to Cao Qiao (草桥) Station and transfer to the subway line 10 to Zhichunlu (知春路) or Zhichunli (知春里) Station which costs about 40 Yuan.

See the links below for more informations.

https://www.bdia.com.cn/#/airportExpress https://www.bjsubway.com/en/

2. Airport Bus: take the airport bus of Zhongguancun Route to Zhongguancun (中关村), which costs about 45 yuan and it takes about one hour and half depending on the traffic condition. Then it takes about 10 minutes to AMSS/Liaoning International Hotel/the Wuke Hotel on foot (see Zhongguancun stop of the Airport shuttle on the map in the next page).

https://www.bdia.com.cn/#/airportBus

3. Taxi: take a taxi to Liaoning International Hotel (辽宁大厦) /the Wuke Hotel (物科宾馆) which costs about 200 Yuan and it takes about nearly two hours depending on the traffic condition.

From Zhichunlu (知春路) or Zhichunli (知春里) to AMSS and the Wuke Hotel (物科宾馆)

It takes about 15 minutes-20 minutes from the subway station to AMSS/the Liaoning International Hotel/the Wuke Hotel (less than 2 km). See the map in the next page.

Location:



Invited Speakers

Ashay Burungale The University of Texas at Austin

Pierre Colmez Centre National de La Recherche Scientifique

Hélène Esnault Free University of Berlin

Laurent Farques Centre National de La Recherche Scientifique

Ziyang Gao Leibniz University Hannover

Dorian Goldfeld Columbia University

Bingrong Huang Shandong University

Sian Nie Academy of Mathematics and Systems Science, CAS

Lue Pan Princeton University

Peng Shan Yau Mathematical Sciences Center, Tsinghua University

Junyi Xie Beijing International Center for Mathematical Research

Shou-Wu Zhang Princeton University

Organizers

Baohua Fu Academy of Mathematics and Systems Science, CAS

Yongquan Hu Academy of Mathematics and Systems Science, CAS

Ye Tian Academy of Mathematics and Systems Science, CAS

Yichao Tian Academy of Mathematics and Systems Science, CAS

Nanhua Xi Academy of Mathematics and Systems Science, CAS

Weizhe Zheng Academy of Mathematics and Systems Science, CAS

Special Guests

Chengming Bai Nankai University

Meng Chen Fudan University

Youwei Chen Chen Jingrun Science Foundation

Longyun Ding Nankai University

Shu Geng UCAS Education Foundation

Jun Hu Beijing Institute of Technology

Guirong Huang Chen Jingrun Science Foundation

Ruochuan Liu Peking University

Yifeng Liu Zhejiang University

Liangang Peng Sichuan University

Hourong Qin Nanjing University

Yu Qiu Tsinghua University

Xiaotao Sun Tianjin University

Shaobin Tan Xiamen University

Quanshui Wu Fudan University

Liang Xiao Peking University

Fei Xu Capital Normal University

Liang Yu Nanjing University

Xinyi Yuan Peking University

Shuo Zhao UCAS Education Foundation

Jiping Zhang Peking University

Conference Schedule

July 29, 2024 (Lecture Hall of Siyuan Building)				
8:30-9:00	Registration: Lecture Hall of Siyuan Building reception			
9:00-10:30		Awarding Ceremony		
10:30-11:00	G	roup Photos & Tea break		
11:00-12:00	Dorian Goldfeld	The functional equation of Langlands Eisenstein series		
12:00-14:00	Lunch, Third floo	or of Wuke Restaurant (物科餐厅三楼)		
14:00-15:00	Hélène Esnault	Diophantine properties of the Betti moduli space (MCM 110)		
15:00-15:30	Tea break			
15:30-16:30	Bingrong Huang	Averages of arithmetic functions (MCM 110)		
17:30-19:30	Banquet, Fourth floor of Wuke Restaurant (物科餐厅四楼)			
	July 30, 2024 (MCM 110)			
9:00-10:00	Sian Nie On higher Deligne-Lusztig characters			
10:00-10:30	Tea break			
10:30-11:30	Peng Shan	Center of small quantum groups and diagonal coinvariants		
11:30-13:30	Lunch, Third floor of Wuke Restaurant (物科餐厅三楼)			
13:30-14:30	Pierre Colmez	On the factorization of the system of Beilinson- Kato		
14:30-15:00	Tea break			
15:00-16:00	Laurent Fargues	Laumon sheaf and the mod p local Langlands correspondence		
16:15-17:15	Lue Pan	Some vanishing results for rational completed cohomology of Shimura varieties		

July 31, 2024 (MCM 110)			
9:00-10:00	Shouwu Zhang	Triple product L-series and Gross-Kudla-Schoen cycles	
10:00-10:30	Tea break		
10:30-11:30	Ashay Burungale	Ashay Burungale Zeta elements for elliptic curves and applications	
11:30-14:00	Lunch, Third floor of Wuke Restaurant (物科餐厅三楼)		
14:00-15:00	Ziyang Gao About algebraic relations between the periods of CM abelian varieties		
15:00-15:30	Tea break		
15:30-16:30	Junyi Xie	Geometric Bombieri-Lang Conjecture	
16:30-17:15	Free Discussion		

July 29 (Monday)	July 30 (Tuesday)	July 31 (Wednesday)
9: 00-10: 30	9:00-10:00	9:00-10:00
Awarding Ceremony	Sian Nie	Shouwu Zhang
10:30-11:00	10:00-10:30	10:00-10:30
Tea Break	Tea Break	Tea Break
11:00-12:00	10:30-11:30	10:30-11:30
Dorian Goldfeld	Peng Shan	Ashay Burungale
12:00-14:00	11:30-13:30	11:30-14:00
Lunch Break	Lunch Break	Lunch Break
14:00-15:00	13:30-14:30	14:00-15:00
Hélène Esnault	Pierre Colmez	Ziyang Gao
15:00-15:30	14:30-15:00	15:00-15:30
Tea Break	Tea Break	Tea Break
15:30-16:30	15:00-16:00	15:30-16:30
Bingrong Huang	Laurent Fargues	Junyi Xie
17:30-19:30	16:15-17:15	16:30-17:15
Banquet	Lue Pan	Free Discussion

Titles and Abstracts

Ashay Burungale (The University of Texas at Austin)

Zeta elements for elliptic curves and applications

The talk plans to outline the existence of certain zeta elements, and an application to special cases of the Birch and Swinnerton-Dyer conjecture. This is a joint work with C. Skinner, Y. Tian and X. Wan.

Pierre Colmez (Centre National de La Recherche Scientifique)

On the factorization of the system of Beilinson-Kato

I will explain how to factor the system of Beilinson-Kato elements as a product of two modular symbols (an algebraic avatar of the Rankin-Selberg formula). This is joint work with Shanwen Wang.

Hélène Esnault (Free University of Berlin)

Diophantine properties of the Betti moduli space

If the Betti moduli space of a smooth quasi-projective variety is non-empty and irreducible over the complex numbers, we prove that it admits an integral point. The statement is more general. The proof includes the use of de Jong conjecture (proven by Gaitsgory using the geometric Langlands correspondence) and the companions (using the arithmetic Langlands correspondence). Joint work with Johan de Jong, based in part on joint work with Michael Groechenig.

Laurent Fargues (Centre National de La Recherche Scientifique)

Laumon sheaf and the mod p local Langlands correspondence

Let E be a finite degree extension of Qp. Given a mod p représentation of the absolute Galois group of E we construct a sheaf on a punctured absolute Banach Colmez space that should give the first step in the construction of the mod p local Langlands correspondence as a représentation of GL_2(E). We will explain the construction of this sheaf and one of its key deep properties: it is holonomic.

Ziyang Gao (Leibniz University Hannover)

About algebraic relations between the periods of CM abelian varieties

Given a CM abelian variety A defined over $\overline{\mathbb{Q}}$, Grothendieck's period conjecture predicts that all the algebraic relations between its periods arise from Hodge cycles of powers of A (called "Hodge

relations"). In this talk, I will start by explaining that these Hodge relations are essentially generated in degree 1 and 2, by introducing the "companions" of A. Next, I will propose a framework to study the quadratic relations between the holomorphic CM periods (the question of linear relations was solves by Wüstholz in the 80s), by introducing a bi- $\overline{\mathbb{Q}}$ -structure on the tangent space of a Shimura variety at a CM point and by proposing a hyperbolic subspace conjecture which is the analogue of Wüstholz's theorem in the Shimura case. This is joint work with Emmanuel Ullmo and partially with Andrei Yafaev.

Dorian Goldfeld (Columbia University)

The functional equation of Langlands Eisenstein series

I shall present a simple explicit description of the general Langland's Eisenstein series for SL(n, Z). It can be shown that the functional equations of these Eisenstein series can be derived from the functional equations of certain divisor sums and Whittaker functions which appear in the Fourier coefficients of the Eisenstein series. We conjecture that these functional equations are unique assuming they take the form of a real affine transformation of the "s" variables defining the Eisenstein series. We can prove uniqueness in certain special cases. This is joint work with Eric Stade and Michael Woodbury.

Bingrong Huang (Shandong University)

Averages of arithmetic functions

In this talk, I will introduce some results on the averages of arithmetic functions, such as the Rankin-Selberg theorem and the Friedlander--Iwaniec theorem on Fourier coefficients of automorphic forms. Then I will sketch how to break the Rankin--Selberg barrier on the second moment of Fourier coefficients of a GL(2) automorphic form. If time permits, I will briefly introduce the GL(3) exponential sums.

Sian Nie (Academy of Mathematics and Systems Science, CAS)

On higher Deligne-Lusztig characters

It is well-known that Deligne-Lusztig characters play an essential role in the classification of irreducible representations of finite groups of Lie type. The higher Deligne-Lusztig characters, arising from cohomological inductions of higher/parahoric Deligne-Lusztig varieties, are natural analogues of Deligne-Lusztig characters. In this talk, I will discuss recent progresses in the study of higher Deligne-Lusztig characters, with an emphasis on their relations with supercuspidal representations of p-adic groups.

Lue Pan (Princeton University)

Some vanishing results for rational completed cohomology of Shimura varieties

Let p be a prime number. Emerton introduced the p-adically completed cohomology, which admits a representation of some p-adic group and can be thought of as some spaces of p-adic automorphic forms. In this talk, I want to explain that for Shimura varieties, sufficiently regular infinitesimal characters of the p-adic group can only show up in the middle degree of the completed cohomology. The proof is based on a very recent result of Bhatt on Kodaira vanishing in mixed characteristic and an old idea of using translation functors. This is joint work in progress with Kai-Wen Lan.

Peng Shan (Yau Mathematical Sciences Center, Tsinghua University)

Center of small quantum groups and diagonal coinvariants

I will explain a proof for an isomorphism between the center of the principal block of the small quantum group in type A and the ring of diagonal coinvariants, confirming a conjecture of Lachowska-Qi. This is based on joint work in progress with Roman Bezrukavnikov, Pablo Boixeda Alvarez and Eric Vasserot.

Junyi Xie (Beijing International Center for Mathematical Research)

Geometric Bombieri-Lang conjecture

The geometric Bombieri-Lang conjecture is an analogue of the Bombieri-Lang conjecture over function fields. With Yuan, we find a mechanism to realize Vojta's dictionary in a reasonably concrete way and proved the geometric Bombieri-Lang conjecture for varieties having a finite map to an abelian variety under mild conditions.

Shou-Wu Zhang (Princeton University)

Triple product L-series and Gross-Kudla-Schoen cycles

In this talk, we consider a conjecture by Gross and Kudla that relates the derivatives of triple product L-functions for three modular forms and the height pairing of the Gross-Schoen cycles on Shimura curves. Then, we sketch proof of a generalization of this conjecture. This is a report on the work in progress with Xinyi Yuan and Wei Zhang, with help from Yifeng Liu.

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WIFI

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- ☐ It will redirect to a register form. Fill the form with Conference ID MCM2024.



