

Time	Speaker	Title
<i>Monday (June 26)</i>		
Mon 9:45am	Zeev RUDNICK	<i>Zeros of modular forms and Quantum Unique Ergodicity</i>
Mon 11:15am	Parimala RAMAN	<i>Arithmetic of 2-dimensional fields—Simply connected groups and Hasse principle</i>
Mon 2:30pm	Chiafu YU	<i>When is a polarized abelian variety determined by its p-divisible group?</i>
Mon 3:45pm	Chan Jeong KUAN	<i>From triple correlation sums to congruent number problem</i>
Mon 5:00pm	Peng-Jie WONG	<i>On the eighth moment of the Riemann zeta function</i>
<i>Tuesday (June 27)</i>		
Tue 9:45am	Ling LONG	<i>Hecke Traces via Hypergeometric Character Sums</i>
Tue 11:15am	Lei FU	<i>Hypergeometric systems on reductive groups</i>
Tue 2:30pm	Yoonbok LEE	<i>Selberg's central limit theorem of L-functions near the critical line</i>
Tue 3:45pm	Sudhir PUJAHARI	<i>Sato-Tate conjecture in arithmetic progressions for certain families of elliptic curves</i>
<i>Wednesday (June 28)</i>		
Wed 9:45am	Igor SHPARLINSKI	<i>Bilinear forms with Kloosterman and Salie Sums and Moments of L-functions</i>
Wed 11:15am	Jiu-Kang YU	<i>A refinement of the Chebotarev density theorem for global function fields</i>
Wed 2:30pm	Peter Jaehyun CHO	<i>Counting cyclic extensions and some applications</i>
Wed 3:45pm	Chien-Hua CHEN	<i>On singular moduli for higher rank Drinfeld modules</i>
Wed 5:00pm	Chun Yin HUI	<i>On the rationality of algebraic monodromy groups of compatible systems</i>
<i>Thursday (June 29)</i>		
Thu 9:45am	Wen-Wei LI	<i>An intertwining relation via Takeda-Wood isomorphism</i>
Thu 11:15am	Yousheng SHI	<i>A proof of the Kudla-Rapoport conjecture for the Kramer model</i>
Thu 3:45pm	Tsz Ho CHAN	<i>Variance of squarefull numbers in short intervals</i>
Thu 5:00pm	Jared LICHTMAN	<i>A proof of the Erdős primitive set conjecture</i>

Abstracts

Tsz Ho Chan, Kennesaw State University

Title: *Variance of squarefull numbers in short intervals*

Let $Q(x)$ denote the counting function of squarefull numbers up to x . In this talk, we consider the variance of squarefull numbers in short intervals, namely,

$$\frac{1}{X} \int_X^{2X} \left| Q(x+y) - Q(x) - \frac{\zeta(3/2)}{\zeta(3)} (\sqrt{x+y} - \sqrt{x}) \right|^2 dx$$

when $X^{1/2+\epsilon} \leq y \leq X^{1-\epsilon}$. We obtain an upper bound for all y and an asymptotic formula in a restricted range. Hence, for any $0 < \theta < 1/2$, almost all short intervals $(x, x + x^{1/2+\theta}]$ contain the expected number of squarefull numbers. This work was inspired by a recent result of Gorodetsky, Matomäki, Radziwiłł and Rodgers on variance of squarefree numbers in short intervals and arithmetic progressions.

Chien-Hua Chen, National Taiwan University

Title: *On singular moduli for higher rank Drinfeld modules*

As a function field analogue of singular moduli for elliptic curves estimated by Gross-Zagier, we estimate the valuation at certain places of singular moduli for prime rank Drinfeld modules. Our estimation can be viewed as a generalization of rank-2 case proved by Dorman.

This talk consists of three parts: Firstly, we compare the valuation of singular moduli with the number of isomorphisms between “Drinfeld module with CM by the ring of integer of an imaginary extension over $\mathbb{F}_q(T)$ ” and “a specific prime rank Drinfeld module with CM by a constant extension of the polynomial ring $\mathbb{F}_q(T)$ ”. Due to the difference between the structure of moduli scheme for Drinfeld modules of rank > 2 and that for Drinfeld modules of rank 2 (which is similar to the elliptic curve case), this comparison can only result into an inequality relation. Secondly, we reduce counting number of isomorphisms into counting number of certain endomorphism on a Drinfeld module whose reduced characteristic polynomial is of certain form. This reduction step makes the counting process more concrete and computable. Lastly, we compute some examples on singular moduli estimation for rank-3 Drinfeld modules.

Jaehyun Cho, Ulsan National Institute of Science and Technology

Title: *Counting cyclic extensions and some applications*

Mäki counted abelian extensions over the rational numbers with a power-saving error term when counted with respect to conductors. On the other hand, Wood established a vertical Chebotarev density theorem for abelian extensions over number fields. We consider a hybrid result of Mäki and Wood. Let l be an odd prime. We count cyclic extension of degree l over the rational numbers with finite local specifications on primes in the extensions. We have a power-saving error term unconditionally and also under GRH. We suggest several applications. This is joint work with G. Oh.

Lei Fu, Tsinghua University

Title: *Hypergeometric systems on reductive groups*

Hypergeometric differential systems on reductive groups are introduced by Kapranov. We study the arithmetic counterpart, that is, the l -adic hypergeometric geometric sheaves and the p -adic hypergeometric arithmetic D -modules on reductive groups, and discuss their application to the study of exponential sums on reductive groups.

Chun Yin Hui, The University of Hong Kong

Title: *On the rationality of algebraic monodromy groups of compatible systems*

Let E be a number field and X a smooth geometrically connected variety defined over a characteristic p finite field. Given an n -dimensional pure E -compatible system of semisimple λ -adic representations of the étale fundamental group of X with connected algebraic monodromy groups \mathbf{G}_λ , we construct a common E -form \mathbf{G} of all the groups \mathbf{G}_λ and in the absolutely irreducible case, a common E -form $\mathbf{G} \hookrightarrow \mathrm{GL}_{n,E}$ of all the tautological representations $\mathbf{G}_\lambda \hookrightarrow \mathrm{GL}_{n,E_\lambda}$. Analogous rationality results in characteristic p assuming the existence of crystalline companions in $\mathbf{F}\text{-Isoc}^\dagger(X) \otimes E_v$ for all $v|p$ and in characteristic zero assuming ordinarity are also obtained. Applications include a construction of \mathbf{G} -compatible system from some GL_n -compatible system and some results predicted by the Mumford-Tate conjecture.

Chan Ieong Kuan, Sun Yat-Sen University

Title: *From triple correlation sums to congruent number problem*

In this talk, we start with talking about a result regarding triple correlation sums of coefficients of cusp forms. Replacing the cusp forms with theta functions, this turns into a statement regarding congruent numbers. Further modifications enable us to investigate the congruent number problem using methods from analytic number theory. This is joint work with T. A. Hulse, D. Lowry-Duda, A. Walker.

Yoonbok Lee, Incheon National University

Title: *Selberg's central limit theorem of L -functions near the critical line*

Selberg's central limit theorem says that the logarithm of the Riemann zeta function has a Gaussian distribution in the complex plane on and near the critical line. We find an asymptotic expansion of a multi-dimensional version of Selberg's central limit theorem for L -functions near the critical line.

Wen-Wei Li, Peking University

Title: *An intertwining relation via Takeda-Wood isomorphism*

For p -adic local fields with odd p , Gan and Savin obtained an isomorphism between the Iwahori-Hecke algebra of $SO(2n + 1)$ and the Hecke algebra of $Mp(2n)$ for the Bernstein component containing the even Weil representation; for the odd component one takes the non-split inner form of $SO(2n + 1)$ instead. Their result is then extended by Takeda and Wood to arbitrary p . In this talk, I will explain how the isomorphism behaves under parabolic induction. As an application, I will sketch a Gindikin-Karpelevich formula for $Mp(2n)$ that applies to dyadic local fields as well. The ultimate motivation comes from Arthur's trace formula for $Mp(2n)$, which gets "wild" over 2. This is an ongoing work joint with Fei Chen.

Jared Duker Lichtman, University of Oxford

Title: *A proof of the Erdős primitive set conjecture*

A set of integers greater than 1 is primitive if no member in the set divides another. Erdős proved in the 1930s that the sum of $1/(a \log a)$, ranging over a in A , is uniformly bounded over all choices of primitive sets A . In the 1980s he asked if this sum is maximized by the set of prime numbers. In this talk we describe recent work which answers Erdős' conjecture in the affirmative. We will also discuss applications to old questions of Erdős, Sárközy, and Szemerédi from the 1960s.

Ling Long, Louisiana State University

Title: *Hecke Traces via Hypergeometric Character Sums*

Hypergeometric character sums are explicit tools which are useful for counting points on hypergeometric varieties. In this talk we give formulas for traces of Hecke operators on certain spaces of modular forms in terms of hypergeometric character sums, extending earlier results of Ahlgren, Frechette-Ono-Papanikolas and Lennon. Especially we consider modular forms for subgroups related to the quaternion algebra with discriminant 6. This is a joint work with Wen-Ching Winnie Li, Jerome William Hoffman, and Fang-Ting Tu.

Sudhir Pujahari, National Institute of Science Education and Research

Title: *Sato-Tate conjecture in arithmetic progressions for certain families of elliptic curves*

In this talk we will study moments of the trace of Frobenius of elliptic curves if the trace is restricted to a fixed arithmetic progression. In conclusion, we will obtain the Sato-Tate distribution for the trace of certain families of Elliptic curves. As a special case we will recover a result of Birch proving Sato-Tate distribution for certain family of elliptic curves. Moreover, we will see that these results follow from asymptotic formulas relating sums and moments of Hurwitz class numbers where the sums are restricted to certain arithmetic progressions. This is a joint work with Kathrin Bringmann and Ben Kane.

Parimala Raman, Emory University

Title: *Arithmetic of 2-dimensional fields—Simply connected groups and Hasse principle*

There is an extensive study of Hasse principle for homogeneous spaces under connected linear algebraic groups over number fields. Simply connected groups become central to Hasse principle for principal homogeneous spaces. We discuss analogous questions in the context of function fields of curves over p -adic fields.

Zeev Rudnick, Tel Aviv University

Title: *Zeros of modular forms and Quantum Unique Ergodicity*

I will discuss the distribution of zeros of modular forms and connection to the problem of Quantum Unique Ergodicity.

Yousheng Shi, University of Wisconsin

Title: *A proof of the Kudla-Rapoport conjecture for the Kramer model*

In this talk, I will talk about a proof of the Kudla-Rapoport conjecture for the Kramer model, which is a precise identity between certain derived intersection number on Rapoport-Zink space and derived local density. After an introduction to the global motivation, I will recall the conjecture and describe the proof strategy. On the geometric side, we completely avoided Tate conjecture and explicit calculation. On the analytic side, we establish a surprisingly simple formula for the primitive derived local density. Combining these two novel ingredients, applying partial Fourier transform proves the conjecture. This is a joint work with Qiao He, Chao Li and Tonghai Yang.

Igor Shparlinski, University of New South Wales

Title: *Bilinear forms with Kloosterman and Salie Sums and Moments of L -functions*

We present some recent results on bilinear forms with complete and incomplete Kloosterman and Salie sums. These results are of independent interest and also play a major role in bounding error terms in asymptotic formulas for moments of various L -functions. We then describe recent several results about non-correlation of Kloosterman and Salie sums between themselves and also with some classical number-theoretic functions such as the Mobius function, the divisor function and the sum of binary digits, etc. Some open problems will be outlined as well.

Peng-Jie Wong, National Sun Yat-Sen University, Taiwan

Title: *On the eighth moment of the Riemann zeta function*

A century ago, the second and fourth moments of the Riemann zeta function over the critical line were established asymptotically by Hardy-Littlewood and Ingham, respectively. And there has been folklore that the sixth and higher moments are beyond current techniques. Nonetheless, a few years ago, Ng proved an asymptotic formula for the sixth moment under a conjecture for ternary additive divisor sums.

In this talk, we shall review some background knowledge and then explain how the Riemann hypothesis and a conjecture for quaternary additive divisor sums imply the conjectural asymptotic for the eighth moment of the Riemann zeta function. This is joint work with Nathan Ng and Quanli Shen, and it builds on the above-mentioned work of Ng. A key new idea is to use sharp bounds for shifted moments of the zeta function over the critical line.

Chia-Fu Yu, Academia Sinica

Title: *When is a polarized abelian variety determined by its p -divisible group?*

If two principally polarized abelian varieties are isomorphic, then their associated p -divisible groups are isomorphic. However, the converse is not true in general. We shall describe precisely when a principally polarized abelian variety is determined by its p -divisible group. We also explain some ingredients of the proof, as well as the connection with results of Chai and Oort on central leaves. This talk is based on the joint papers with Tomoyoshi Ibukiyama, Valentijn Karemaker and Fuetaro Yobuko.

Jiu-Kang Yu, Chinese University of Hong Kong

Title: *A refinement of the Chebotarev density theorem for global function fields*

We will give a strengthened version of the Chebotarev density theorem for global function fields, and discuss problems about prime distributions which led to this result.