Program

June 18, 2012
Monday

Chairman: G. Wüstholz

9:20 – 9:30 *Opening Speech*
Mok, Ngaiming, Director, Institute of Mathematical Research, HKU

9:30 – 10:30 **Hoffstein, Jeffrey**, Brown University
Multiple Dirichlet series and shifted convolutions

10:30 – 11:30 **Harcos, Gergely**, Alfréd Rényi Institute of Mathematics
On the sup-norm of Maass cusp forms of large level

Coffee Break

12:00 – 12:50 **Royer, Emmanuel**, Université Blaise Pascal
Poisson structure on quasimodular forms

Lunch Break

Chairman: J. Liu

15:00 – 16:00 **Steuding, Jörn**, Universität Würzburg
The Riemann zeta-function on arithmetic progressions

16:00 – 17:00 **Ki, Haseo**, Yonsei University
Uniqueness of functions in the extended Selberg class

Coffee Break

17:30 – 18:00 **Christ, Thomas**, Universität Würzburg
Discrete probabilistic moments of the Riemann zeta-function

June 19, 2012
Tuesday

Chairman: J. Hoffstein

9:30 – 10:30 **Habegger, Philipp**, Goethe-Universität
Non-Archimedean approximations by special points

10:30 – 11:30 **Yang, Yi-fan**, National Chiao Tung University
Schwarzian differential equations and Hecke eigenforms on Shimura curves

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Coffee Break

12:00 – 12:50 **von Känel, Rafael**, Institute for Advanced Study
Heights and conductors of elliptic curves

Lunch Break

Chairman: H. Ki

15:00 – 16:00 **Chan, Tsz-Ho**, Victory University
Twin squarefull numbers

16:00 – 17:00 **Lau, Yuk-Kam**, The University of Hong Kong
On random multiplicative functions

Coffee Break

17:30 – 18:00 **TBA**

June 20, 2012
Wednesday

Chairman: H.H. Chan

9:30 – 10:30 **Liu, Jianya**, Shandong University
Prime solutions of homogeneous diophantine equations

10:30 – 11:30 **Lü, Guangshi**, Shandong University
On divisor problems related to the Epstein zeta-function

Coffee Break

12:00 – 12:50 **Li, Charles**, The Chinese University of Hong Kong
Trace formula of GL(2) in explicit form

Lunch Break

Chairman: A. Sankaranarayanan

15:00 – 16:00 **Kühne, Lars**, ETH Zentrum
An effective result of André-Oort type

16:00 – 17:00 **Chan, Heng Huat**, National University of Singapore
On Bailey-Brafman identity for a function of Appell

Coffee Break

17:30 – 18:00 **TBA**

June 21, 2012
Thursday

Chairman: J. Steuding

9:30 – 10:30 **Motohashi, Yoichi**, Nihon University
Some observations on the Selberg sieve and related problems

10:30 – 11:30 **Sankaranarayanan, Ayyadurai**, TIFR, India / NIMS, South Korea
On certain twisted non-linear exponential sums

Coffee Break

12:00 – 12:50 **Tsang, Kai-Man**, The University of Hong Kong
On certain mean values of exponential sums over primes

Lunch Break

Chairman: Y. Motohashi

15:00 – 16:00 **Xiong, Maosheng**, The Hong Kong University of Science and Technology
Distribution of zeros of zeta functions for abelian extension of the rational function field over a finite field

16:00 – 17:00 **Wüstholz, Gisbert**, ETH Zentrum
Periods

Coffee Break

17:30 – 18:00 **Wang, Yingnan**, The University of Hong Kong
A large sieve inequality of Elliott-Montgomery-Vaughan type for Maass forms and its applications

18:00 – 18:10 *Closing Remarks*
Lu, Jiang-hua, Head of Department of Mathematics, HKU

Abstracts

Chan, Heng Huat, National University of Singapore

On Bailey-Brafman identity for a function of Appell

In this talk, we define Appell's function F_4 and discuss the motivation behind its definition. We will derive Bailey's identity involving F_4 and the product of hypergeometric functions. We then discuss Brafman's identity which is a consequence of Bailey's identity and use this identity to prove several series for $1/\pi$ discovered by Sun in January of 2011. We end the talk with analogues of Brafman's identity discovered by Wan and Zudilin.

Chan, Tsz-Ho, Victory University

Twin squarefull numbers

A number is squarefull if the exponent of every prime in its prime factorization is at least two. In this talk, we will look at the number of pairs of squarefull numbers n, $n+l$ when n is less than a given quantity.

Christ, Thomas, Universität Würzburg

Discrete probabilistic moments of the Riemann zeta-function

We consider the asymptotic behaviour of discrete moments of the Riemann zeta-function

$$\frac{1}{N}\sum_{n\in\{1,\dots,N\}\setminus B}\left|\zeta(\sigma+in\alpha)\right|^{2k},\quad \sigma>\frac{1}{2},\ \alpha\in\mathbb{R},\ k\in\mathbb{N},\ N\to\infty,$$

where we obmit a certain set $B\subset\mathbb{N}$ of density zero from the set of summation.
Following an idea of J.-I. Tanaka, we establish for these 'probabilistic' moments (with some restrictions on the parameter $\alpha\in\mathbb{R}$) asymptotic extensions which prove in a weak sense certain mean value theorems for the zeta-function, equivalent to the Lindelöf hypothesis.
References: J.-I. Tanaka, Dirichlet series induced by the Riemann zeta function, Studia Math. 187 (2008), 157-184

Habegger, Philipp, Goethe-Universität

Non-Archimedean approximations by special points

For a prime p, Tate and Voloch proved that a linear form in roots of unity is either zero or p-adically bounded from below by a positive constant that is independent of the roots of unity. They also conjectured that a subvariety of a semi-abelian variety does not admit arbitrarily good p-adic

approximations by torsion points. Buium and Mattuck made progress and Scanlon gave a full proof using work of Chatzidakis and Hrushovski on the model theory of difference fields.
I will present some work in progress towards a modular version of the Tate-Voloch Conjecture. In a product of classical modular curves, a special point of ordinary reduction at p cannot p-adically approximate a fixed subvariety to well. The proof relies on recent joint work with Pila on the modular Mordell-Lang Conjecture and a refinement of it by Pila.

Harcos, Gergely, Alfréd Rényi Institute of Mathematics

On the sup-norm of Maass cusp forms of large level

Let f be a Hecke–Maass cuspidal newform of square-free level N and Laplacian eigenvalue λ. I will discuss the recent joint result with Nicolas Templier that $\|f\|_\infty \ll_{\lambda,\epsilon} N^{-1/6+\epsilon}\|f\|_2$ for any $\epsilon > 0$, with an implied constant depending continuously on λ.

Hoffstein, Jeffrey, Brown University

Multiple Dirichlet series and shifted convolutions

I'll define, and describe a new method for obtaining the meromorphic continuation of, shifted Rankin-Selberg convolutions in several variables. I'll also describe some applications, including a mean value estimate for the second moment of twists of $GL(2)$ L-series by Dirichlet characters modulo Q.

von Känel, Rafael, Institute for Advanced Study

Heights and conductors of elliptic curves

We give explicit inequalities which relate heights and conductors of elliptic curves over number fields, and we discuss Diophantine applications.

Ki, Haseo, Yonsei University

Uniqueness of functions in the extended Selberg class

I show that if for a nonzero complex number c the inverse images $L_1(c)$ and $L_2(c)$ of two functions in the extended Selberg class are the same, then $L_1(s)$ and $L_2(s)$ must be identical. Also, I will propose a problem concerning this.

Kühne, Lars, ETH Zentrum

An effective result of André-Oort type

I present a rarely known approach to the Andre-Oort Conjecture (AOC) that goes back to Yves Andre himself: Before the model-theoretic proofs of the AOC in certain cases by the Pila-Wilkie-

Zannier approach, Andre presented in 1998 the first proof of the AOC in the case of a product of two modular curves. In my talk, I discuss some newer results following Andrés method. In particular, I will show that Andrés original proof from 1998 can actually be used for effective computations and to obtain uniform effective bounds for the Weil height of special points on a non-special curve inside a product of two modular curves.

Lau, Yuk-Kam, The University of Hong Kong

On random multiplicative functions

In this talk, a random multiplicative function f is referred as a multiplicative function supported on squarefree integers, whose components on primes are independent Bernoulli random variables. We shall explore the mean value $\sum_{n\leq x} f(n)$.

Li, Charles, The Chinese University of Hong Kong

Trace formula of $GL(2)$ in explicit form

In this talk, we will use representation theory to derive different kinds of trace formula on $GL(2)$. Explicit formulas and some applications will be given.

Liu, Jianya, Shandong University

Prime solutions of homogeneous diophantine equations

Establishing solubility of general Diophantine equations in primes is of considerable complexity, and the non-diagonal terms therein cause an extra difficulty. In this talk I will describe how analytic methods can be applied to detect prime solutions of general homogeneous Diophantine equations that may have many non-diagonal terms. For example it is proved that, under a mild condition, 10 variables are enough to guarantee the existence of infinitely many prime solutions of general quadratic equations.

Lü, Guangshi, Shandong University

On divisor problems related to the Epstein zeta-function

Jointly with Jie Wu and Wenguang Zhai, we studied several divisor problems related to the Epstein zeta-function. We are able to improve previous results and establish some new results by applying some classical techniques.

Motohashi, Yoichi, Nihon University

Some observations on the Selberg sieve and related problems

We shall give an account of our recent work related to the Selberg sieve and the following three topics:
1) Extension of Linnik's phenomenon concerning the repelling effect of Siegel zeros,
2) Large sieve extension of the Brun-Tichmarsh theorem,
3) Enveloping large-sieve over intervals.

Royer, Emmanuel, Université Blaise Pascal

Poisson structure on quasimodular forms

I will present a joint work with Franois Dumas on the Poisson structures over the algebra of quasi-modular forms.

Sankaranarayanan, Ayyadurai, TIFR, India / NIMS, South Korea

On certain twisted non-linear exponential sums

In this talk, we discuss about a non-trivial upper bound for the quantity

$$\left| \sum_{X \leq n \leq 2X} a(n)\ e^{2\pi i \alpha \sqrt{n}} \right|$$

where α is a non-zero real number and $a(n) = \lambda(n)$ or $\mu(n)$.

Steuding, Jörn, Universität Würzburg

The Riemann zeta-function on arithmetic progressions (joint work with Elias Wegert, TU Freiberg)

We investigate the distribution of values of the Riemann zeta-function $\zeta(s)$ on vertical arithmetic progressions $s_k = s_0 + ik\delta$ for $k = 0, 1, 2 \ldots$ and fixed positive δ. Putnam (1954) proved that there is no infinite arithmetic progression of zeros inside the critical strip; van Frankenhuijsen (2005) extended this result in showing that if there is a finite arithmetic progression of zeros of length N and common difference δ, then N is bounded by some quantity depending only δ and the real-part of s. We prove asymptotic formulas for the first discrete moment of the zeta-function on certain vertical arithmetic progressions inside the critical strip. Our method relies on an appropriate approximate functional equation for $\zeta(s)$ and estimates for exponential sums; another approach is by contour integration.

Tsang, Kai-Man, The University of Hong Kong

On certain mean values of exponential sums over primes

In this talk I will discuss two mean value estimates for the exponential sum

$$\sum_{p\sim N} \chi(p)\log p \;\; e(\alpha p)$$

over prime numbers p and primitive dirichlet characters χ. Using these and together with other ideas, one can obtain improved bounds for prime solutions of the ternary equation

$$a_1p_1 + a_2p_2 + a_3p_3 = n \ .$$

(This is a joint work with J.Y. Liu)

Wang, Yingnan, The University of Hong Kong

A large sieve inequality of Elliott-Montgomery-Vaughan type for Maass forms and its applications

In 2008, Lau and Wu proved a large sieve inequality of Elliott-Montgomery-Vaughan type for holomorphic cusp forms. Using this large sieve inequality, they proved some statistic results on Hecke eigenvalues of primitive holomorphic cusp forms and the distribution of the values of the symmetric power L-functions attached to primitive holomorphic cusp forms at the point 1. In this talk, we will consider the generalization of Lau and Wu's result to primitive Maass forms over short intervals.

Wüstholz, Gisbert, ETH Zentrum

Periods

In the talk I shall explain what periods are and I shall give a few classical examples. This will illustrate the general circle of problems which come up naturally when periods are considered. One problem is about hypergeometric functions, one is a conjecture by Leibniz and the last problem is a conjecture of Kontsevich which gives a precise description of the period algebra. If there is time we shall relate it to recent work of Brown on multizetas.

Xiong, Maosheng, The Hong Kong University of Science and Technology

Distribution of zeros of zeta functions for abelian extension of the rational function field over a finite field

Let K be the rational function field over a finite field and let L be a finite extension of K. It is well-known by the Riemann hypothesis of curves that the zeros of the zeta function of L all lie on a circle. It is interesting to study how the zeros are distributed on the circle when L is taken over a family of function fields, and various families have been considered. In this work we take all abelian extensions of K with a given Galois group as our family, ordered by the conductor. We prove that as

the norm of the conductor goes to infinity, for any fixed arc on the circle, the number of zeros lying in the arc is proportional to the length of the arc, and after a suitable normalization it converges to a standard Gaussian distribution.

Yang, Yi-fan, National Chiao Tung University

Schwarzian differential equations and Hecke eigenforms on Shimura curves

In this talk, we will first characterize automorphic forms on Shimura curves of genus 0 in terms of solutions of Schwarzian differential equations. We then present a method to compute Hecke operators on these spaces. Some interesting applications include special values of hypergeometric functions, algebraic transformations of hypergeometric functions, Ramanujan-type formulas for Shimura curves, and modular equations for Shimura curves.