A GENERAL TAUBERIAN THEOREM OF WIENER-IKEHARA TYPE

Bin Chen (Ghent University)

Abstract: The Wiener-Ikehara theorem plays a central role in complex Tauberian theory. Since its publication, there have been numerous applications and generalization of this theorem. Recently, Koga gave an version of the Wiener-Ikehara where only boundary properties of the real part of Laplace transform are used. In this talk, we generalized and improve this theorem of Koga by weakening the requirements on the real part of Laplace transform. Our arguments are based on a measure theoretic approach.

EXPLICIT RESULTS ON THE SUM OF A PRIME AND ALMOST PRIME

Daniel Johnston (University of New South Wales, Canberra)

Abstract: Over the last 100 years, many weak forms of Goldbach's conjecture have been explored. One of the most studied is the problem of writing even numbers as the sum of a prime and another number with a bounded number of prime factors. In this mini-talk, we will state recent conditional and unconditional explicit results of this form, and provide avenues by which one could improve these results further.

THE DISTRIBUTION OF PRIME IDEALS IN A NUMBER FIELD

Ethan Lee (University of New South Wales, Canberra)

Abstract: In mathematics, we tend towards the strongest possible result, however this is not always the optimal choice. That is, we only need the sledgehammer, when the hammer will no longer do. In this talk, I will describe how explicit Mertens' theorems for number fields overcome technical difficulties that present in the explicit prime number theorem for number fields, then provide example applications from my research.

EXPLICIT BOUNDS ON THE SUMMATORY FUNCTION OF THE MÖBIUS FUNCTION USING THE PERRON FORMULA

Nicol Leong (University of New South Wales, Canberra)

Abstract: We use Perron formula arguments to establish explicit bounds on $M(x)$, the Mertens function, an important function in number theory closely related to the zeta function. We give estimates of the form $M(x) \ll x$,

$M(x) \ll x \log x \exp(-c_1\sqrt{\log x})$, and $M(x) \ll x \exp(-c_2\sqrt{\log x})$, the first good for small values of x, and the latter two good for extremely large x. For the range of x in between, bounds of the first type are then used to refine estimates of the form $M(x) \ll x/(\log x)^k$, using a method of Schoenfeld's.

This work is joint with Ethan Lee.

ON THE NUMBER OF RATIONAL POINTS CLOSE TO A COMPACT MANIFOLD UNDER A LESS RESTRICTIVE CURVATURE CONDITION

Florian Munkelt (University Goettingen)

Abstract: Let $\mathscr{M}$ be a compact submanifold of $\mathbb{R}^M$. In this article we establish an asymptotic formula for the number of rational points within a given distance to $\mathscr{M}$ and with bounded denominators under the assumption that $\mathscr{M}$ fulfills a certain curvature condition. Our result generalizes earlier work from Schindler and Yamagishi, as our curvature condition is a relaxation of that used by them. We are able to recover a similar result concerning a conjecture by Huang and a slightly weaker analogue of Serre's dimension growth conjecture for compact submanifolds of $\mathbb{R}^M$.

THE SINGULAR SERIES OF A CUBIC FORM IN 10 VARIABLES

Christian Bernert (University of Göttingen)

Abstract: We prove the absolute convergence of the singular series of a cubic form C in 10 variables, assuming Davenport's 'Geometric Condition'. This improves on a result of Heath-Brown and establishes the positivity of the main term in the conjectural asymptotic formula for the number of solutions of $C(\mathbf{x}) = 0$. As in Heath-Brown's work, we use van der Corput differencing to bound the relevant Gauss sums on average over prime moduli. Along the way, we found a new and short proof of Davenport's 'Shrinking Lemma'.

WELL-BEHAVED BEURLING NUMBER SYSTEMS

Frederik Broucke (Ghent University)

Abstract: A Beurling number system is a pair of sequences $(\mathcal{P}, \mathcal{N})$, whose elements are called generalized primes and generalized integers. The sequence of generalized primes can be any non-decreasing, unbounded sequence of reals $p_1 \le p_2 \le p_3 \le \dots$, with the requirement that $p_1 > 1$. The

sequence of generalized integers is the multiplicative semigroup generated by $\mathcal{P}$ and 1, ordered in non-decreasing fashion: $n_0 = 1 < n_1 = p_1 \le n_2 \le n_3 \le \dots$. We denote the counting functions of these sequences with $\pi(x)$ and $N(x)$ respectively. One of the main aims of the theory is the investigation of the relationship between these two counting functions, especially when they are close to their classical counterpart, in the sense that

$$\pi(x) \sim \mathrm{Li}(x) = \int_2^x \frac{\mathrm{d}u}{\log u}, \qquad N(x) \sim \rho x,$$

for some $\rho > 0$. In this talk I will discuss number systems with well-behaved primes or integers, meaning that one has a power-type remainder $O(x^\theta)$, $\theta < 1$, in one or both of the above relations.

NUMERICAL VERIFICATION OF MAASS CUSP FORMS

Andrei Seymour-Howell (University of Bristol)

Abstract: Maass forms are complex valued functions on the upper half plane, which similar to modular forms transform under the action of a discrete subgroup G of SL(2,R). In addition, they are eigenfunctions of the hyperbolic Laplacian defined on the upper half-plane and satisfy certain growth conditions at the cusps of a fundamental domain of G. However, unlike modular forms, Maass forms need not be holomorphic. In this talk I will give a brief introduction to Maass forms and describe some numerical results from a new method to numerically compute and rigorously certify their Laplace eigenvalues.

THE AVERAGE LEAST QUADRATIC NON-RESIDUE AND FURTHER VARIATIONS

Jackie Voros (University of Bristol)

Abstract: The problem of bounding the least quadratic non-residue has entertained many mathematicians for centuries. We introduce Erdös's approach in a slightly different problem, the average least quadratic non-residue, and highlight that this problem has multiple analogues. Primarily, we will focus on the analogue of Hecke eigenvalues. Certain modular forms, newforms, are always eigenfunctions to Hecke operators and so we consider the average least negative Hecke eigenvalue and find startlingly similar parallels to Erdös's problem on average least quadratic non-residues.