Monday Week 1, Session 1 (4:45-5:15)

Room A: Higher rank L-functions

1. **Dobrowolski Jakub**: Second Moment Estimate for $\mathrm{GL}(n) \times \mathrm{GL}(n)$ Rankin–Selberg L-functions

   In this talk, we will briefly introduce the subconvexity problem and approach to it via the method of moments. We will mention our result on the asymptotic formula for the second moment of $\mathrm{GL}(n) \times \mathrm{GL}(n)$ Rankin-Selberg L function and give a sketch proof. Based on joint work with Subhajit Jana and Ramon Nunes.

2. **Cossaboom, Catherine:** Zero density estimates for GL_2 automorphic L-functions

   We prove zero density estimates for L-functions of cuspidal automorphic representations π of $\mathrm{GL}_2(\mathbb{A}_\mathbb{Q})$. We show that $N_L(\sigma, T) \ll T^{\frac{5}{2}(1-\sigma)+o(1)}$, where $N_L(\sigma, T)$ denotes the number of zeros $\rho = \beta + i\gamma$ of $L(s, \pi)$ with $\beta \geq \sigma$ and $|\gamma| \leq T$. The key input is an extension of the Guth–Maynard argument to Dirichlet polynomials whose coefficients satisfy a weaker ℓ^q bound.

3. **Ye, Liyuan:** Test vectors for local trilinear forms

   The p-adic newforms play a central role in the theory of non-archimedean representations. However, their archimedean analogue is not well understood. In this talk, I will introduce the analytic newvector theory, developed by Jana–Nelson, and show an application to the subconvexity problem in the conductor-dropping range.

Room B: Point Counting

1. **Giacomo Bortolussi:** Bateman–Horn conjecture for random polynomials

   We discuss recent progress on the Bateman–Horn conjecture for random polynomials. By employing Hooley neutralizers, we were able to show that, in a certain range, worse than square-root cancellation holds on average.

2. **Uhlemann, Justin:** Powerful solutions of generalised diagonal forms

   We present some results on asymptotic counts for the number of powerful solutions of bounded height on high-dimensional hypersurfaces defined by a generalised class of diagonal forms.

3. **Colpo, Davide:** Manin's conjecture for a del Pezzo surface of degree 1 with log-terminal singularities of index 2

   We present a proof of Manin's conjecture for a dP1 with worse-than-ADE singularities, which is achieved via the universal torsor method. In this case the Iitaka fibration becomes relevant and this additional geometric input allows us to perform the counting. This is the first del Pezzo surface of degree 1 for which Manin's conjecture is known for rational points, while state of the art is degree 2 for dP surfaces with ADE singularities and degree 4 for smooth dP surfaces.

Monday Week 1, Session 2 (5:30-6:00)

Room A: Asymptotics for partial sums of Dirichlet series

1. **Singha Roy, Akash:** The Landau-Selberg-Delange method for Dirichlet L-functions, and applications

   The Landau-Selberg-Delange "LSD" method gives asymptotic expansions for the partial sums of the coefficients of a Dirichlet series that behaves like a complex power of the Riemann zeta function. However, situations often arise when the Dirichlet series behaves like (a product of) complex powers of Dirichlet L-functions to a modulus q. In such situations, one often requires asymptotics for the partial sums, that apply in really wide ranges of q, often much wider than available from existing forms (or extensions) of the LSD method. In this talk, we address this problem, obtaining complete asymptotic expansions that hold true for q varying in these substantially wider ranges. Our results also lead to a variety of new applications that were not accessible with previous literature on mean values of multiplicative functions.

2. **Shala, Besfort:** Modified Dirichlet Characters

   We report on recent progress towards understanding the growth of partial sums of modified Dirichlet characters. Addressing a conjecture of Klurman, Mangerel, Pohoata, and Teräväinen, our results improve upon several previous works for general modifications, and we establish a sharp result when the modifications are roots of unity. This is joint work with Marco Aymone, Pierre-Alexandre Bazin, Andrew Granville, and Oleksiy Klurman.

3. **Severn, Alistair:** The LSD method along sums of three squares

   The classical LSD method gives asymptotics for sums of multiplicative functions. In this talk I will discuss how one can prove similar asymptotics for sums of multiplicative functions along sums of three squares. These sums have applications to a problem of counting the number of conics in a family which contain a rational point.

Room B: Elliptic curves

1. **Wang, Tian:** Equidistribution of transformed Frobenius traces for products of elliptic curves

   In 1968, Birch proved that the normalized Frobenius traces of elliptic curves over finite fields are equidistributed with respect to the Sato–Tate measure. Subsequent work of Niederreiter, and many others established effective versions of this result. I will discuss a generalization to products of elliptic curves, proving effective equidistribution results for transformations of tuples of Frobenius traces. This is joint work with Mohammad Hamdar.

2. **Hamdar, Mohammad:** Ranks of Elliptic Curves Twisted by Quadratic Forms

   Let E be an elliptic curve over the rationals, and let E^d be its twist by the quadratic character χ_d. Information about the ranks of E^d is an important question in Number Theory, and one reason is its deep connection to the Birch and Swinnerton-Dyer conjecture. Restricting the twists to be in thinner sets is also an important but harder question. In this talk, I will show that there are infinitely many twists d which are sums of two squares such that E^d has rank 1. This is joint work with Cihan Sabuncu (Max Planck).

3. **Mishra, Prabhat Kumar:** Effective joint Sato–Tate distribution and its applications

   The Sato–Tate theorem describes the statistical behaviour of Fourier coefficients of modular forms, but obtaining effective versions in higher dimensions remains a challenging problem. Building on the works of Thorner, we give a geometric approach that yields an effective joint Sato–Tate theorem for a large class of Borel measurable subsets of $[-2,2]^2$. This leads to new quantitative results on symmetric power coefficients, sign changes, and variants of multiplicity-one phenomena.

Tuesday Week 1, Session 1 (4:45-5:15)

Room A: Quadratisch, Praktisch, Gut

1. **Mehrabdollahei, Mahya:** Mahler Measures and Dirichlet L-Functions: New Results on Chinburg's Conjectures

   In this talk, I present recent results obtained in collaboration with David Hokken and Berend Ringeling on Chinburg's conjectures, which propose a connection between Mahler measures and certain special values of Dirichlet L-functions associated with odd quadratic characters.

2. **Nosal, Pawel:** The typical size of squarefree sums of Legendre symbols is $o(\sqrt{x})$

   We prove conjecturally sharp upper bounds for the low moments of squarefree sums of Legendre symbols
   $$\frac{\log R}{R} \sum_{R \le r \le 2R} \Big| \sum_{\square \nmid n \le x} \big(\frac{n}{r}\big) \Big|^{2q},$$
   for $0 \le q \le 1$ and $x \le R^{0.49}$, where r are primes in the interval $[R, 2R]$ for a large R. In particular, a sum over squarefree integers of a typical Legendre symbol exhibits "better than squareroot cancellation".

3. **Bernardini, Riccardo:** Upper bounds on class numbers of real quadratic fields

   We show that, for any $\epsilon > 0$, the number of real quadratic fields $\mathbf{Q}(\sqrt{d})$ with discriminant $d < x$ whose class number is $\ll \sqrt{d}(\log d)^{-2}(\log \log d)^{-1}$ is at least $x^{1/2-\epsilon}$. This improves by a factor $\log \log d$ a result from 1971 by Yamamoto.

Room B: L-functions, automorphic forms, and eigenfunctions

1. **Mujdei, Catinca:** Low-lying zeros of a family of toroidal L-functions

   The Katz–Sarnak philosophy aims to describe the distribution of the zeros of a family $\mathcal{F}$ of $L-$functions near the central point $s = 1/2$, with the L-functions ordered by their analytic conductor. It is conjectured that such a distribution is governed by a symmetry group $G(\mathcal{F})$ related to random matrix theory. I will discuss some progress providing encouraging evidence towards this conjecture for a toroidal family.

2. **Montaigu, Laurent:** Variance of Fourier coefficients of automorphic forms in arithmetic progressions

   The aim of this talk is to introduce some results analogous to the Barban-Davenport-Halberstam theorem for Fourier coefficients of automorphic forms.

3. **Sanchez Garza, Maximiliano:** The Geodesic Restriction Problem for Arithmetic Spherical Harmonics

   Given a Riemannian manifold M and an L^2-normalized Laplacian eigenfunction ψ with eigenvalue λ^2, a general problem is to understand how the mass of ψ distributes around M as $\lambda \to \infty$. One approach is to bound the L^p-norm of ψ restricted to a submanifold of M. There are results in this direction by Burq, Gérard, and Tzvetkov, shown to be optimal in general. In this talk, I will discuss an improvement on these results in the case of the 2-sphere.

Tuesday Week 1, Session 2 (5:30-5:50)

Room A: Zeta zeroes

1. **Gupta, Vishal:** Zero density estimates

   Zero density estimates are bounds for the number of possible exceptions to the Riemann hypothesis that have consequences for counts of primes on short intervals. I will briefly explain these estimates and discuss some recent developments in the area.

2. **Bueno, Caio:** A random Dirichlet polynomial: modelling the Riemann zeta function

   We briefly discuss a model for the Riemann zeta function using a random version of a Dirichlet polynomial, with coefficients being standard Gaussian random variables. We present results regarding the expected number of zeros of the real part of our random function and show how it compares to the classical deterministic result on the number of zeros of the Riemann zeta function in the critical strip. This is based on a joint work with Marco Aymone.

Room B: Counting number fields

1. **Hansen, Willem:** Counting octic Galois extensions by multi-heights

   A central question in arithmetic statistics is Malle's conjecture, which predicts the asymptotic growth of number fields with a fixed Galois group ordered by discriminant. Recently, Gundlach introduced a framework for ordering number fields using collections of invariants, rather than a single height function. We will introduce this framework and present recent results on counting degree-eight Galois extensions by multi-heights. This is based in part on joint work with Anna Zanoli.

2. **Tavernier, Julie:** Malle's conjecture on the stack BG

   Malle's conjecture predicts the asymptotic distribution of number fields with a fixed finite Galois group. We discuss recent developments that interpret this conjecture in terms of algebraic stacks and Brauer groups. Using this framework, we then explain a new stack-theoretic version of Poisson summation, and its applications to questions related to Malle's conjecture and the prescribed ramification problem.

Monday Week 2, Session 1 (4:45-5:15)

Room A: Lattices and matrices

1. **Felber, Gilles:** Counting representations of quadratic forms

   The Gauss circle problem asks about the number of integral vectors v such that $v^t v < r$. We consider the following generalization: given a fixed m by m matrix R, how many k by m integral matrices T are there such that $R - T^t T$ is positive definite (denoted $T^t T < R$). This problem can be studied using matrix Bessel functions introduced by Herz.

2. **Wurzinger, Lena:** Lattices of fixed determinant

   Schmidt proved an asymptotic formula for the number of integer lattices of bounded determinant. I will discuss formulas for rank two lattices of fixed determinant, especially inside four-dimensional space; as an application, we can improve the error term of Schmidt's formula in this special case.

3. **Gargava, Nihar:** A counterexample to a question of Sarnak

   I will present a counterexample to a question of Sarnak that was framed as a conjecture by Chiu. It asks which unit covolume lattices minimize the height function: the log of the determinant of an associated Laplacian operator. It was conjectured that the height is minimized by the lattice which maximizes the packing density. I will explain why this conjecture is false in dimension 9.

Room B: Multiplicative functions and counting problems

1. **Menon, Siddarth:** Improved bounds for multiplicative functions in short intervals

   We refine the Matomäki–Radziwiłł method for short sums of multiplicative functions on average, and give bounds for the Liouville function and more general non-pretentious multiplicative functions that are almost optimal via their method. As an application, we improve the quantitative bounds for the averaged Chowla conjecture of Matomäki–Radziwiłł–Tao.

2. **Parry, Tomos:** Exponential sums of divisor functions and the binary divisor problem

   Call $S(\alpha) := \sum_{n<x} f(n)e(n\alpha)$ the exponential sum of f and $\int_0^1 |S(\alpha)|d\alpha$ its L^1 mean. We give a result on the L^1 mean for the exponential sum of $d(n)$ and float the idea that a similar result for $d_3(n)$ might be of use in the binary additive divisor problem.

3. **Katsivelos Christos:** Local average of the error term in the hyperbolic lattice counting problem

   Starting from the description of the classical Euclidean circle problem, we pass to the hyperbolic analogue, where we count points in the orbit of a discrete group Γ acting on the hyperbolic space $\mathbb{H}^n$ within a ball of radius $\log X$. We will discuss our results for the local average of the error term of the counting function over compact sets of the orbifold $\Gamma\backslash\mathbb{H}^n$.

Monday Week 2, Session 2 (5:30-6:00)

Room A: Exponential and character sums

1. **Iggidr, Amine:** Large values of mixed character sums

   In this talk, I will present a result on the distribution of values for "mixed character sums," which are exponential sums with weights given by values of a Dirichlet character. If one takes the character to be Legendre's symbol, we recover values of Fekete polynomials on the unit circle. This results provide strong support for a conjecture of Montgomery on the maximum of Fekete polynomials on the unit circle.

2. **Xie, Sizhe:** Multiple Gauss sums

   A multiple Gauss sum is a complete multiple exponential sum twisted by Dirichlet characters. We prove a new bound for multiple Gauss sums and, as an application, improve previous results in the Birch–Goldbach problem.

3. **Wafik, Mohamed:** Finite Fourier transform of doubly singular binary quintic forms

   We compute the finite Fourier transform of the indicator function of binary quintic forms whose discriminant is strongly divisible by p^2. Using Sylvester's canonical form for binary forms of odd degree together with the classical ring of invariants of the binary quintic, we classify such forms according to their splitting type and to the vanishing of some invariants. The problem is reduced to point counting on a few varieties arising from suitable bilinear pairings.

Room B: Primes

1. **Johnston, Daniel:** The Reverse Goldbach conjecture

   Reversed primes are prime numbers written backwards in some fixed number base $b \geq 2$. Although once confined to the realms of recreational and elementary number theory, reversed primes are now studied using deep analytic tools. In this short talk, we discuss the reverse Goldbach conjecture, whereby we consider replacing the primes in Goldbach's conjecture with reversed primes. This is joint work with Michael Harm.

2. **Abi Abdallah, Rebecca:** Integers divisible by a shifted prime in a given interval

   The multiplication table problem is related to counting the number of integers up to x that have a divisor in an interval $(y, z]$. In this talk, we restrict the divisor to being a shifted prime, an integer of the form $p - 1$ with p prime. By studying the asymptotic behaviour of this quantity for all $z = z(y)$, we observe phase transitions that reveal the interdependent behaviour of such divisors based on the logarithmic length of the interval. This generalizes Ford's result, which covers the case where $z = \infty$. This is joint work with V. Kovaleva, J. Schlitt, and N. Tardy.

3. **Li, Jiamin:** Theorem (1+1.9) on the Goldbach Conjecture

   Addressing Goldbach's Conjecture, we prove (1+1.9) unconditionally. A key byproduct is a continuous P_2-to-P_1 transition, hinting at surprising emergent structures within the problem. This potential discovery bridges the gap beyond (1+2), reaching 1.4 under Elliott-Halberstam.

Tuesday Week 2, Session 1 (4:45-5:15)

Room A: Inverse problems

1. **Bazin, Péa:** The inverse Littlewood problem for multiplicative functions (joint w/ O. Klurman)

   We show that a completely multiplicative function $f : \mathbf{N} \to \mathbf{U} \cup \{0\}$ satisfies

   $$\int_0^1 \left| \sum_{n \le x} f(n) e(\alpha n) \right| d\alpha \ll \log x$$

   for all large $x \geq 3$ if and only if $f(n) = \chi(n) n^{it}$ for some Dirichlet character χ and some $t \in \mathbf{R}$. This establishes an asymptotic inverse Littlewood theorem for multiplicative functions.

2. **Manna, Riddhi:** Quadratic inverse large sieve conjecture

   Given a set of integers A, which is a subset of $[1, N]$, the large sieve and the larger sieve inequalities give upper bounds for the cardinality of A from information about how many residue classes A occupies modulo each prime p. For instance, if a set A occupies about αp residue classes modulo each prime p, the larger sieve gives the bound N^α for the size of A. The quadratic inverse large sieve conjecture states that if the set A is close to the size $N^{1/2}$ and exhibits this type of behaviour modulo each prime p, then it consists of the squares or any other dense quadratic structure. In this talk, I will discuss the history of this conjecture and some of my recent work which provide evidence towards this conjecture.

3. **Wessel, Mieke:** Inverse problems in function fields

   Inverse problems in additive combinatorics ask: if $|A + A|$ is small, what does this imply about A? These types of questions can be generalized to a function field setting, where A is replaced by a vector space S and the sum by the componentwise product. Freiman showed that if $|A + A| < 3|A| - 3$ then $A + A$ contains a long arithmetic progression. In this talk we explore the generalization of this: if $\dim S^2 < 3 \dim S - 3$, then S^2 contains a large Riemann-Roch space.

Room B: Non-vanishing and visibility

1. **Earnst, Adam:** Non-vanishing of Dirichlet L-functions with restricted root number

   Attached to any Dirichlet L-function is a complex number of modulus 1, called the root number. This number determines certain properties of the L-function, namely its functional equation. A question of great interest in number theory is the order of vanishing of L-functions at their central point, s=1/2. In this talk, I will explain how we can use the method of mollified moments to calculate non-vanishing results on a subfamily of Dirichlet L-functions defined by a restriction on the root number.

2. **Filippo Berta:** Non-vanishing of toroidal Dirichlet L-functions

   In this talk, we will discuss how recent results of Fouvry, Kowalski, Michel and Sawin can be used to obtain new results on simultaneous non vanishing of Dirichlet at the central line, with additional angular constraints.

3. **Naccarato, Francesco:** Selmer companions and visible elements in the Tate-Shafarevich group

   I will outline a method to exhibit elements in the Tate–Shafarevich group of elliptic curves that are visible in an abelian surface, exploiting some recently constructed families of Selmer companions. I will explain how this relates to controlling rank jumps in certain elliptic families, and how analytic tools can help in this setting.

Tuesday Week 2, Session 2 (5:30-5:50)

Room A: Chebotarev and Linnik Problems

1. **Acosta Reche, Alberto:** About the error term in the Chebotarev geodesic theorem

   The Chebotarev geodesic theorem is analogous to the Chebotarev density theorem, in the same way that the prime geodesic theorem is analogous to the prime number theorem. We generalize previous work of Luo and Sarnak, and of Soundararajan and Young, and prove that the exponent $25/36+\epsilon$ is admissible for the error term of the Chebotarev geodesic theorem for Fuchsian quaternion groups.

2. **Bruna, Matías:** A conditional bound for the least prime in an arithmetic progression

   For a, q coprime integers, let P(a,q) be the least prime p = a (mod q). In 1944 Linnik proved that $P(a,q) \ll q^L$ for some absolute constant L, with the current best exponent L=5 due to Xylouris. On the other hand, this bound dramatically reduces to roughly $\ll q^{(2+\epsilon)}$ under GRH. In this talk we will see that one can recover the bound $\ll q^{(2+\epsilon)}$ under a weaker conjecture, and comment on unconditional results that can be derived from the method.

Room B: Distribution modulo 1

1. **Aolo, Régis:** The Optimal Diophantine Exponent for the $\mathrm{SL}_d(Z)$-Action on $\mathbb{T}^d$

   How well can the orbit of a point under integer unimodular matrices approximate another point on the torus? This question is addressed by establishing a general Khintchine-type theorem for arbitrary sequences of integer matrices acting on the d-dimensional torus. As an application, the Diophantine exponent of the action of $\mathrm{SL}_d(Z)$ on $\mathbb{T}^d$ is shown to be equal to $d-1$, extending the previously known two-dimensional result and confirming the optimal exponent conjectured by Gorodnik, Ghosh, and Nevo.

2. **Xiao, Yixiu:** Moment Estimates and Discrepancy for Sums of Square Roots Modulo 1

   Let $k \geq 2$ be fixed. We study the distribution modulo 1 of the n^k sums

   $$\sqrt{a_1}+\cdots+\sqrt{a_k}, \qquad 1 \leq a_1, \ldots, a_k \leq n,$$

   counted with multiplicity. For

   $$S(h,n) = \sum_{n/2 \leq a \leq n} \mathbf{e}(h\sqrt{a}), \qquad \mathbf{e}(x) = \exp(2\pi i x),$$

   we prove second- and fourth-moment estimates matching the diagonal scale up to a factor n^{ε}. More precisely,

   $$\sum_{H/2 \leq h \leq H} |S(h,n)|^2 \ll_{\varepsilon,\delta} Hn^{1+\varepsilon}$$

   uniformly for $H \geq n^{1/2+\delta}$, and

   $$\sum_{H/2 \leq h \leq H} |S(h,n)|^4 \ll_{\varepsilon,\delta} Hn^{2+\varepsilon}$$

   uniformly for $n^{1/2+\delta} \leq H \leq n^{2/3}$, where $0<\delta<1/6$ in the fourth-moment estimate. Combining the second-moment bound with pointwise exponential-sum estimates and the Erdős–Turán inequality, we obtain

   $$D_k(n) \leq n^{-\rho_k+o(1)}, \qquad \rho_k = \frac{71k+26}{26k+116},$$

   as $n \to \infty$, where $D_k(n)$ denotes the discrepancy with respect to arbitrary subintervals of $[0,1)$.