Analytic Number Theory
Théorie analytique des nombres

(Org: **Philippe Michel** (Montpellier) and/et **Ram Murty** (Queen's))

AMIR AKBARY, University of Lethbridge, Lethbridge, Alberta

Reduction mod p of subgroups of the Mordell–Weil group of an elliptic curve

We investigate that for a free subgroup of the Mordell–Weil group of an elliptic curve defined over rationals, how the order of the reduction of this subgroup mod p varies as p goes to infinity. We discuss some results regarding the lower bounds on the size of the reduced subgroup.

This is a joint work with Kumar Murty.

MICHAEL BENNETT, University of British Columbia, Vancouver, BC

Powers in progression, Chebotarev and Hilbert Class Polynomials

I will sketch some rather odd connections between ternary Diophantine equations, the Chebotarev Density Theorem and heights of Hilbert class polynomials evaluated at rational arguments. These lead to a number of new results on the problem of expressing perfect powers as the product of terms in arithmetic progression.

MICHAEL COONS, Simon Fraser University, 8888 University Drive, Burnaby, BC V5A 1S6

Some Properties of Completely Multiplicative Signatures

A completely multiplicative signature is a function $f\colon \mathbb{N} \to \{1,-1\}$ such that $f(mn) = f(m)f(m)$ for all $m, n \in \mathbb{N}$. We will address properties of their summatory functions, $\sum_{n\le x} f(n)$, as well as issues surrounding irrationality, transcendence and normality of certain numbers associated to these functions. Related examples and conjectures will be presented.

This is joint work with Peter Borwein and Stephen Choi.

JOHN FRIEDLANDER, University of Toronto

Sifting Short Intervals

We discuss some very old work of the speaker and some recent developments thereof obtained in joint work with Henryk Iwaniec. We apply sieve methods to study the number of primes and almost-primes in "most" short intervals. In particular, we obtain bounds which seem likely to be optimal as to the length of the intervals.

GREG MARTIN, University of British Columbia, Department of Mathematics, Room 121, 1984 Mathematics Road, Vancouver, BC V6T 1Z2

Friable values of polynomials

We summarize the current meager state of knowledge concerning how often values of polynomials have only small prime factors (that is, the values are "friable" or "smooth"). We also present some evidence, in the form of a theorem conditional upon a suitably explicit hypothesis on prime values of polynomials, to support a conjectured asymptotic formula for the number of friable values of any polynomial.

CHRISTIAN MAUDUIT, Université de la Méditerranée, 163 avenue de Luminy, 13288 Marseille Cedex 9, France
La somme des chiffres des carrés

L'objectif de cet exposé est de présenter un travail en commun avec Joel Rivat concernant la représentation q-adique des carrés. Nous montrons en particulier que (sous des conditions nécessaires triviales), la somme des chiffres des carrés est équirépartie dans les progressions arithmétiques, ce qui répond à une question posée en 1968 par Alexandre Gelfond.

The main purpose of this talk is to present a joint work with Joel Rivat concerning the study of the q-adic representation of square numbers. In particular, we prove that (under some obvious necessary conditions), the sum of digits of squares is well distributed in arithmetic progression, which answer to a question asked by Alexander Gelfond in 1968.

KUMAR MURTY, Toronto

GUILLAUME RICOTTA, Université de Bordeaux 1
Mean-periodicity and zeta functions

The general admitted expectation is that the right objects parametrizing L-functions are automorphic representations. In a joint work with Ivan Fesenko and Masatoshi Suzuki, it is suggested that the right objects parametrizing Hasse zeta functions of arithmetic schemes are mean-periodic functions over the real line, which have at most polynomial growth. Such Hasse zeta functions are conjecturally ratios of L-functions. The traditional method to prove the expected analytic properties of such Hasse zeta functions is to prove automorphic properties of each of the conjectural L-functions factors, which is not entirely satisfactory. It is shown in this work that establishing the expected analytic properties of these zeta functions boils down to proving the mean-periodicity of some explicit functions on the real line. This talk will focus on the models of zeta functions of elliptic curves.

JOEL RIVAT, Aix–Marseille Université
La somme des chiffres des nombres premiers

Nous apportons une réponse à une question posée par Gelfond en 1968 en montrant que la somme des chiffres $s_q(p)$ des nombres premiers p écrits en base $q \geq 2$ est équirépartie dans les progressions arithmétiques (excepté pour certains cas dégénérés bien connus). Nous montrons également que la suite $\big(\alpha s_q(p)\big)$ où p décrit l'ensemble des nombres premiers est équirépartie modulo 1 si et seulement si $\alpha \in \mathbf{R} \setminus \mathbf{Q}$.

We answer a question proposed by Gelfond in 1968. We prove that the sum of digits of prime numbers written in a basis $q \geq 2$ is equidistributed in arithmetic progressions (except for some well known degenerate cases). We prove also that the sequence $\big(\alpha s_q(p)\big)$ where p runs through the prime numbers is equidistributed modulo 1 if and only if $\alpha \in \mathbf{R} \setminus \mathbf{Q}$.

DAMIEN ROY, Université d'Ottawa, Département de mathématiques, 585 King Edward, Ottawa, Ontario, K1N 6N5
Simultaneous rational approximation and the Markoff spectrum

We review recent results concerning simultaneous approximation of a real number and its square by rational numbers with the same denominator and establish a connexion with the Markoff spectrum.

EMMANUEL ROYER, Blaise Pascal, Clermont-Ferrand
On a inequality by Damey & Payan

We will use a formula due to Fouvry & Kluners to establish by elementary methods an inequality of Damey & Payan on the 4-rank of quadratic fields.

KANEENIKA SINHA, University of Toronto, Toronto, Ontario
Effective equidistribution

We will discuss a generalization of the famous inequality of Erdös and Turán. This general, all-purpose equidistribution theorem has many diverse applications. In particular, we will look at effective equidistribution of eigenvalues of Hecke operators acting on spaces of cusp forms. This enables us to study the factorization of Jacobians of modular curves into simple Abelian varieties. Our effective equidistribution theorem can also be applied to study the eigenvalues of Frobenius acting on a family of curves over a fixed finite field as well as the eigenvalue distribution of adjacency matrices of families of regular graphs.

This is joint work with M. Ram Murty.

THOMAS STOLL, Vienna University of Technology
The sum of digits of primes in $\mathbb{Z}[i]$

We study the distribution of the complex sum-of-digits function s_q with basis $q = -a \pm i$, $a \in \mathbb{Z}^+$ for Gaussian primes p. Inspired by a recent result of Mauduit and Rivat for the real sum-of-digits function, we here get uniform distribution modulo 1 of the sequence $\big(\alpha s_q(p)\big)$ provided $\alpha \in \mathbb{R} \setminus \mathbb{Q}$ and q is prime with $a \geq 28$. We also determine the order of magnitude of the number of Gaussian primes whose sum-of-digits evaluation lies in some fixed residue class mod m.

This is joint work with M. Drmota and J. Rivat.

JIE WU, Institut Elie Cartan, Nancy-Université, 54506 Vandoeuvre-lès-Nancy, France
Inégalité du grand crible pour formes modulaires et deux applications

Dans ce travail en commun avec Y.-K. Lau, nous avons démontré une inégalité du grand crible de type Elliott–Montgomery–Vaughan pour les coéfficients de Fourier de formes primitives. Comme applications, nous avons résolu la partie de majoration dans la première conjecture de Montgomery–Vaughan sur les valeurs extrêmes de $L(1, f)$ et amélioré les bornes de Duke–Kowalski de type presque sûre concernant le problème de Linnik pour les formes modulaires.