TITLES AND ABSTRACTS

M. Waldschmidt (IMJ, Paris)
Title: Transcendence on commutative algebraic groups

T. N. Shorey (NIAS, Bengaluru)
Title: Linear forms in logarithms and its applications

C. S. Rajan (TIFR, Mumbai)
Title: Analytic continuation of $L$-functions and Tate’s thesis

Shanta Laishram (ISI, New Delhi)
Title: On a Conjecture of Erdos on Squares in Arithmetic Progression

Abstract: A remarkable result of Erdos and Selfridge states that a product of a two or more consecutive integers is never a perfect power. Erdos conjectured that if a product of $k$ consecutive terms of an arithmetic progression is a perfect power, then $k$ is bounded explicitly. In this talk, I will give an overview of the problem with emphasis on the squares case and present some new results.

Subha Sarkar (HRI, Allahabad)
Title: Regularity of certain Diophantine equations

Abstract: In Ramsey theory, there is a vast literature on regularity questions of linear Diophantine equations. Some problems in higher degree have been considered recently. Here, we show that, for every pair of positive integers $r$ and $n$, there exists an integer $B = B(r)$ such that the Diophantine equation

$$\prod_{m=1}^{n} \left( \sum_{i=1}^{k_m} a_{m,i}x_{m,i} - \sum_{j=1}^{l_m} b_{m,j}y_{m,j} \right) = B$$

with

$$\sum_{i=1}^{k_m} a_{m,i} = \sum_{j=1}^{l_m} b_{m,j} \quad \forall m = 1, \ldots, n$$

is $r$-regular, where $k_m, l_m$ are also positive integers and $a_{m,i}, b_{m,j}$ are non-zero integers.
Bidisha Roy (HRI, Allahabad)  
**Title:** Torsion groups of Mordell curves over number fields  

Abstract: In this talk, we will discuss about possible torsion groups of Mordell curves over any cubic number field. Also we will talk about possible torsion groups of rational Mordell curves over any sextic number field.

Mithun Das (HRI, Allahabad)  
**Title:** Measures of positive and negative values of various $Z$-functions  

Abstract: The $Z$-function is a real valued function for real variable $t$, introduced by G. H. Hardy in 1914 to study the Riemann zeta function along the line $1/2 + it$, called the critical line. Recently, S M Gonek and A Ivić (JNT, 2017) conjecture that the measure of positive and negative values of Hardy’s $Z$-function in the interval $[T, T + H]$ are asymptotically $H/2$, where $H$ is quite small but not too small. For theoretical support, they prove that both measures are $\gg H$ in the the interval $[T, T + H]$, with $H = T^\theta$, $3/4 + \epsilon < \theta \leq 1$. In my talk I will show that the Lebesgue measure of both positive and negative values of certain $Z$-functions have positive density in the interval $[T, T + H]$. Also, we construct a new family of meromorphic function, called Generalized Davenport-Heilbronn function and using Karatsubas method we count the number of critical zeros. Finally I will talk about our recent result which is an improvement and generalization of the above result by S M Gonek and A Ivić. These are joint work with S. Pujahari.

B. Ramakrishnan (HRI, Allahabad)  
**Title:** On Shimura and Shintani maps on the Kohnen plus space  

Abstract: In this talk we shall discuss about the Shimura and Shintani maps on certain subspace in the Kohnen plus space. This is an extension of a work of Choi and Kim and it is a joint work with Manish Pandey and Anup Kumar Singh.

Rupam Barman (IIT, Guwahati)  
**Title:** Hypergeometric series and modular forms  

Abstract: We will introduce finite field and $p$-adic hypergeometric series. We will then present some "hypergeometric trace formulas" for the traces of Hecke operators on spaces of cusp forms. We will also discuss about Rodriguez-Villegas conjectures on truncated hypergeometric series and modular forms.
Moni Kumari (TIFR, Mumbai)
Title: Parity of Fourier coefficients of hauptmoduln \( j_N(z) \) and \( j^+_N(z) \)

Abstract: In the theory of modular functions, the study of congruences for Fourier coefficients has a long history. In particular, congruences for the coefficients \( c(n) \) of the Klein’s \( j \)-function have been studied by many mathematicians. Regarding the parity of \( c(n) \), it is easy to check that \( c(n) \) is even whenever \( n \) is not congruent \( 7 \mod 8 \). This motivates us to ask the parity of \( c(n) \) in the arithmetic progression \( n \not\equiv 7 \mod 8 \). A large amount of work has recently been done in this direction, by a variety of methods.

In this talk, we will see some natural generalization of the above question for the Fourier coefficients of hauptmoduln \( j_N(z) \) and \( j^+_N(z) \), for some positive integers \( N \).

Balesh Kumar (IMSc, Chennai)
Title: Angular changes of Fourier coefficients at primes.

Abstract: In the talk, we discuss the angle changes of Fourier coefficients of cusp forms and q-exponents of generalized modular functions at primes.

Manish Pandey (HRI, Allahabad)
Title: Determining modular forms of half integral weight

Abstract: Determining modular forms is one of the central problems in number theory. In general Fourier coefficients of modular forms determine them. After the work of Luo and Ramakrishnan determining modular forms by the central values of convolution function has been considered by many authors in several aspects as weight, level and twist by different forms. In this talk, we will consider the problem of determining modular forms of half-integral weight by central values of their twisted \( L \)-functions. This work is a generalization of the work of Ganguly, Hofstein and Sengupta in the half-integral weight case.

G. Kasi Viswanathan (IISER, Berhampur)
Title: Products of weighted multiple zeta functions

Abstract: We define the weighted multiple zeta functions which are certain variants of the usual multiple zeta functions. We characterise all the weighted multiple zeta functions whose products satisfy stuffle (shuffle) relation.
Ratnadeep Acharya (HRI, Allahabad)
Title: An analogue of the Bombieri-Vinogradov theorem for Fourier coefficients of cusp forms

Abstract: We prove analogues of the Bombieri-Vinogradov Theorem and the Barban-Davenport-Halberstam Theorem on primes in arithmetic progressions for Fourier coefficients of cusp forms. Moreover, as an application of the first one we prove an analogue of the Titchmarsh Divisor Problem.

Prem Prakash Pandey (IISER, Berhampur)
Title: Values of polynomials and class number

Abstract: Conjecture (Buniakowsky, 1876): Let $f(X) \in \mathbb{Z}[X]$ be a polynomial such that the greatest common divisor of the set $\{f(n) : n \in \mathbb{Z}\}$ is 1. The polynomial $f(X)$ is irreducible if and only if it takes infinitely many prime values.

The conjecture is known only when the degree of $f(X)$ is one; this is the celebrated Dirichlet prime number theorem. In case the degree of $f(X)$ is one, the density of prime values taken by $f(X)$ is known. On the other hand, the Buniakowsky conjecture in not proven for a single polynomial of degree more than one. In this talk, for each odd prime number $\ell$ we construct a polynomial $F_\ell(X)$ of degree $(\ell - 1)/2$ for which we are able to prove the Buniakowsky conjecture under some assumption on non-divisibility of the class number of imaginary quadratic fields in certain family.

M. Subramani (HRI, Allahabad)
Title: Euclidean ideal class

Abstract: Let $K$ be an algebraic number field and $\mathcal{O}_K$ be its ring of integers. H.W. Lenstra defined Euclidean ideal class on a number field and proved that if an ideal class $[C]$ is Euclidean then the class group $Cl_K$ is cyclic and $Cl_K = \langle C \rangle$. Also, he proved the converse assuming the generalized Riemann hypothesis (GRH). Recently, M. Ram Murty, H. Graves removed the assumption of GRH for a family of number fields. In this talk, we will discuss the existence of Euclidean ideal class for a certain class of biquadratic fields without assuming GRH. This is a joint work with Jaitra Chattopadhyay, HRI

M. Manickam (KSOM, Kozhikode)
Title: On newforms of half-integral weight

Abstract: In this talk, overview of newforms and very recent results will be discussed.
Soumya Das (IISc, Bengaluru)
Title: Fundamental Fourier coefficients of Siegel modular forms

Abstract: It is well known that modular forms are uniquely determined from its Fourier expansion. However for applications, one often needs to consider only special subsets of all Fourier coefficients, like those indexed by square-free integers. We would give a survey of known results on this topic along with very recent developments.

Abhash Kumar Jha (IISc, Bengaluru)
Title: Fundamental Fourier coefficients of Siegel modular forms.

Abstract: In this talk, we prove that a non-zero Siegel modular form of half integral weight is determined by its fundamental Fourier coefficients.

Arvind Kumar (TIFR, Mumbai)
Title: Certain identities among eigenforms

Abstract: Identities among modular forms (in particular, Hecke eigenforms) have attracted the attention of many mathematicians since they imply nice identities among their Fourier coefficients. We investigate when the product and more generally Rankin-Cohen brackets of two Hecke eigenforms is an eigenform. Duke and Ghate independently addressed this topic (the product case) for eigenforms of the full modular group, proving there are only 16 such identities. In this talk, we will give a brief survey of the existing results in this direction after introducing the spaces of quasimodular and nearly holomorphic modular forms. In the main result, we classify all the cases when the Rankin-Cohen bracket of two quasimodular eigenforms results in an eigenform. In the process, we obtain some new polynomial identities among quasimodular eigenforms. We also establish some interesting results for the space of nearly holomorphic modular forms in the course of the proof. This talk is based on joint works with J. Meher.

Saranya G. Nair
Title: Explicit abc conjecture and its applications

Abstract: We state well-known abc conjecture of Masser - Oesterlé and its explicit version, popularly known as the explicit abc conjecture, due to Baker. Let

\[ a + b = c, \]

where \( a, b \) and \( c \) are coprime positive integers and \( p \) be prime. We denote the radical of \( abc \) by \( N = N(abc) = \prod p^{v_p(abc)} \). Laishram and Shorey derived from the explicit \( abc \)-conjecture that \( c < N^{1.75} \) for \( N > 2 \). We prove that \( c < N^{1.7} \) for \( N > 2 \) and apply this
estimate on an equation related to a conjecture of Hickerson that a factorial is not a product of factorials non-trivially. This is joint work with K. C Chim and T.N Shorey.

K. Srilakshmi (IISER, Thiruvanthapuram)
Title: The Eisenstein elements of modular symbols of square-free Level

Abstract: We present the explicit expression of the Eisenstein elements inside the space of modular symbols for Eisenstein series with integer coefficients for the congruence subgroups \( \Gamma_0(N) \) of square-free level \( N \). This answers a question of Merel. Our results are explicit versions of the Manin-Drinfeld theorem. This is joint work with Debargha Banerjee.

A. Pramath (IISc, Bengaluru)
Title: Norms of the pullbacks of Saito - Kurokawa lifts and the amplification method

Abstract: In this talk I will introduce the pullbacks of the Saito - Kurokawa lifts and the norm associated with them. Then I will explain how the amplification method can be used to improve the existing bounds for these norms.

Saurabh Singh (ISI, Kolkata)
Title: Sub-convexity problems: Some history and recent developments

Abstract: Bounding automorphic \( L \)-functions on the critical line \( \text{Re}(s) = 1/2 \) is a central problem in the analytic theory of \( L \)-functions. The functional equation and the Phragmen-Lindelöf principle from complex analysis yield the convexity bound \( L(1/2 + it, \pi) \ll C(\pi, t)^{1/4 + \varepsilon} \) where \( C(\pi, t) \) is the “conductor” of the \( L \)-function. Lindelöf hypothesis predicts that the bound \( C(\pi, t)^{\varepsilon} \) for any \( \varepsilon > 0 \). Any bound with exponent smaller than 1/4 is called a sub-convexity bound. First sub-convexity bound was proved for the Riemann zeta function by Hardy-Littlewood and Weyl independently. In this context the Weyl exponent 1/6, which is one-third of the way down from convexity towards Lindelöf, is a known barrier which has been achieved only for a handful of families.

In this talk we shall talk about some recent developments and new techniques for proving a subconvexity bounds.
Ritwik Pal (IISc, Bengaluru)
Title: First negative eigenvalue of Yoshida lifts

Abstract: In recent years there has been a lot of activity in the theme of research of locating the first negative eigenvalue of newforms and the first sign change of the Fourier coefficients of arbitrary cusp forms (non-CM). In the case of Siegel newforms of genus 2, it seems to be that the best results available in this direction were given by W. Kohnen and J. Senupta (for full level). Later based upon their method it was generalized by J. Brown in the case of arbitrary level $N \geq 1$ (which was held as a constant). The topic of my talk is about a recent result by me and Prof. Soumya Das, where we have significantly improved upon the previously known upper bound result of the first negative eigenvalue in the case of Yoshida lifts.

R. Thangadurai (HRI, Allahabad)
Title: On a $\pm 1$ weighted zerosum problem

Abstract. Let $G$ be a finite abelian group written additively with exponent $n$. In this talk, we discuss an ongoing work with Bidisha Roy on $\pm 1$ weighted zerosum sequence of length $n$ in $G$.

Sudhansu Sekhar Rout (IMA, Bhubaneswar)
Title: Sums of $S$-units in recurrence sequences

Abstract: In this talk, we give various finiteness results concerning terms of recurrence sequences $U_n$ representable as a sum of $S$-units with a fixed number of terms. We prove that under certain (necessary) conditions, the number of indices $n$ for which $U_n$ allows such a representation is finite, and can be bounded in terms of the parameters involved. In this generality, our result is ineffective, i.e. we cannot bound the size of the exceptional indices. We also give an effective result, under some stronger assumptions. This is a joint work with Berczes, Hajdu, and Pink.

Pallab K. Dey (RKMVU, Belur)
Title: Powerful numbers concerning product of consecutive integer values of a polynomial

Abstract: In this talk, we will focus on non-existence of Powerful numbers coming through products of consecutive integer values of a polynomial. Mainly, we will focus on the polynomial $(x^k + a^k)$ for a fixed integer $a$ and will see various results regarding powerful numbers.
Nabin Meher (NISER, Bhubaneswar)

Title: Analytic continuation of the multiple Fibonacci zeta function

Abstract: In this talk, we discuss the meromorphic continuation of the multiple Fibonacci zeta function. We compute a complete list of poles which turn out to be simple and the residues at these poles. We also prove that multiple Fibonacci zeta function at negative integer arguments are rational.

P. Akhilesh (CMI, Chennai)

Title: Multiple zeta values and Multiple Apéry-like sums

Abstract: Multiple zeta values (also called Euler-Zagier numbers) are the numbers

\[ \zeta(a_1, \ldots, a_r) = \sum_{n_1 > \ldots > n_r > 0} n_1^{-a_1} \ldots n_r^{-a_r}, \]

where \((a_1, \ldots, a_r)\) of positive integers and \(r \geq 1\) and \(a_1 \geq 2\). In this talk I will introduce and study Multiple Apéry-like sums. I shall give an account of the following theorem, any multiple zeta values can be expressed as a \(\mathbb{Z}\)-linear combination of multiple Apéry-like sums. Moreover, with an additional requirement about tails of the series, this expression is unique (and explicit). The simplest example is Euler's famous formula \(\zeta(2) = 3 \sum_{m=1}^{\infty} m^{-2} \left( \frac{2m}{m} \right)^{-1} \).