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Theme of the Conference

INTERNATIONAL CONFERENCE ON DIOPHANTINE
EQUATIONS, POLYNOMIALS & RELATED AREAS

The **International Conference on Diophantine Equations, Polynomials & Related Areas (ICDEPRA-2026)** serves as a forum to explore current and emerging directions in the field of number theory. The conference brings together established experts, young researchers, and students to share new ideas and foster collaborations across mathematics and related disciplines.

Central Themes

1. Diophantine Equations:

These fundamental equations play a central role in understanding numerical structures across mathematics. Advances in effective methods for solving them continue to drive progress in number theory and its applications.

2. Polynomials:

Polynomials are fundamental algebraic expressions whose properties form the foundation of modern number theory. Key research explores features like irreducibility, Galois groups, and monogeneity to bridge concepts across algebra, geometry, and algebraic number fields.

3. Interdisciplinary Applications:

The intersection of number theory, computer science, and cryptography is a rapidly growing field. Key research focuses on how these connections enhance secure communication and computational mathematics.

Objectives

- **Knowledge Exchange:** Provide researchers a platform to present their latest work, share insights, and discuss new developments.
- **Networking and Collaboration:** Encourage interaction among scholars, students, and experts across different institutions and fields.
- **Inspiring Future Research:** Encourage new ideas and methods to guide future directions in number theory and its applications.

The conference ultimately aims to strengthen the engagement of Indian faculty and young researchers with the global mathematical community, fostering long-term collaboration, and advancing the frontiers of number theory.

Prof. Sudesh Kaur Khanduja

FELICITATION – 75TH BIRTHDAY CELEBRATION

Professor Sudesh Kaur Khanduja is a distinguished Indian mathematician known for her deep contributions to algebra and number theory, especially in valuation theory and algebraic number theory. Born on 1 January 1951, she completed her education from Panjab University, Chandigarh. Over the course of her illustrious career, Professor Khanduja spent more than four decades with the Department of Mathematics at Panjab University, where she is currently an Emeritus Professor. In 2011, she joined the Indian Institute of Science Education and Research (IISER) Mohali as a Professor, where she is currently working as an INSA Honorary Scientist.



Prof. Khanduja's groundbreaking research has led to significant advances in valuation theory, the factorization of polynomials over valued fields, and generalizations of classical irreducibility criteria such as the Eisenstein–Dumas criterion. Her contributions extend to the computation of integral bases and discriminants of algebraic number fields, as well as other central problems in algebra and number theory. She has developed novel approaches to classical problems in algebraic number theory through the use of valuations, thereby enabling a potential extension of these to a wider class of rings.

Throughout her illustrious career, Professor Sudesh Khanduja has collaborated extensively with leading mathematicians internationally, authoring nearly 100 research publications. She has provided mentorship to a new generation of mathematicians, having officially supervised 13 Ph.D. students.

In addition to her research articles, Professor Khanduja has significantly contributed to mathematical literature through her survey articles, as well as her authored work **A Textbook of Algebraic Number Theory** (published by Springer). These works are widely regarded as valuable resources for researchers and students in the fields of valuation theory and algebraic number theory.

Distinctions

- **Haryana Vigyan Ratna Award** by the *Government of Haryana* in 2023.
- **Srinivasa Ramanujan Medal** by the *Indian National Science Academy* (INSA) in 2022.
- **S. Ramanujan Memorial Award** by the *Indian Mathematical Society* in 2022.
- **Fellow** of *The World Academy of Sciences* (TWAS) since 2016.
- **Distinguished Alumnus Award** by *Panjab University Alumni Association* in 2016.
- **Professor V.V. Narlikar Memorial Lecture Award** by the *Indian National Science Academy* (INSA) in 2015.
- **Fellow** of the *Indian Academy of Sciences* (IAS) since 2010.
- **Fellow** of the *Indian National Science Academy* (INSA) since 2005.
- **Fellow** of the *National Academy of Sciences, India* (NASI) since 2003.

During the conference, we will honor Professor Sudesh Khanduja in celebration of her remarkable journey and achievements in mathematics as she marks her 75th birthday.

About IIT Madras

INDIAN INSTITUTE OF TECHNOLOGY MADRAS

The **Indian Institute of Technology Madras (IIT Madras)** is renowned both nationally and internationally for its excellence in technical education, cutting-edge research, innovation, entrepreneurship, and industrial consultancy. A distinguished faculty, a vibrant and talented student community, dedicated technical and administrative staff, and a forward-looking administration have all contributed to its pre-eminent status. IIT Madras has been recognized as an **Institute of Eminence** by the Government of India.

Established in 1959, IIT Madras owes its origin to the first Indo-German collaboration in higher education, following an agreement signed in Bonn in 1956. The Institute was formally inaugurated in 1959 by Prof. Humayun Kabir, then Union Minister for Scientific Research and Cultural Affairs. Today, IIT Madras stands among the foremost of the 23 IITs across India, continuing its tradition of excellence in education and research.

Nestled in a serene, wooded campus of about 250 hectares in the heart of Chennai – the capital of Tamil Nadu – IIT Madras is a fully residential institution with nearly 600 faculty members, 10,000 students, and 1,000 supporting staff. The Institute comprises 18 academic departments and several advanced interdisciplinary research centers.

Top-Ranked Institution in India

Ranked as the **Top Engineering Institute** for 10 consecutive years and the **Best Overall Institution** for the past 7 years in the National Institutional Ranking Framework (NIRF) issued by the Ministry of Education, Government of India.

Beyond academics, IIT Madras is known for its vibrant campus culture, exemplified by events such as **Saarang** – one of India’s largest student-run cultural festivals – and **Shaastra**, a premier technical festival. The unique “Insti lingo” developed by generations of students reflects the creativity, humor, and camaraderie that make the IIT Madras community distinctively dynamic and innovative.

Official Website: <https://www.iitm.ac.in>

Department of Mathematics

IIT MADRAS

Established in 1959 alongside the inception of the Institute, the **Department of Mathematics at IIT Madras** stands as one of India's premier hubs for advanced mathematical research, high-level education, and interdisciplinary collaboration. Combining foundational mathematical research with industrial applications, the department serves both the broader mathematical community and the core engineering and scientific disciplines of IIT Madras. The department is ranked **first in India and 84th globally** in Mathematics according to the *QS University World Rankings in 2026*.

The department offers postdoctoral research opportunities, a doctoral program in mathematics, and two postgraduate degrees, namely M.Sc. in Mathematics and M.Tech. in Industrial Mathematics and Scientific Computing. In addition to these specialized courses, the department provides strong academic support to other programs across the Institute. The department is also actively engaged in organizing workshops, weekly seminars, training schools, and faculty development programs for researchers, academicians, and students across India and abroad.

Research at the Department of Mathematics, IIT Madras, spans a wide spectrum of pure, applied, and computational mathematics, driven by a distinguished group of faculty members and research scholars. The major thrust areas of research include:

- **Algebra and Number Theory**
- **Analysis and Linear Algebra**
- **Combinatorics and Theoretical Computer Science**
- **Differential Equations and Applied Mathematics**
- **Geometry and Topology**
- **Probability and Statistics**

The department maintains state-of-the-art facilities, including high-performance computing laboratories and specialized research centers, that are continually updated to drive cutting-edge mathematical research. These advanced resources support computational modeling, theoretical analysis, and collaborative projects across various disciplines.

Organizing Committee

ICDEPRA 2026

| Conveners

- **Anuj Jakhar**, IIT Madras
- **Shanta Laishram**, ISI Delhi
- **K. Srinivas**, IISER Tirupati

| Organizers

- **Saranya G. Nair**, BITS Pilani KK Birla Goa Campus
- **Naveen Kumar**, IIT Madras
- **Prabhakar Yadav**, Sabanci Universitesi, Turkey
- **Mahesh Kumar Ram**, IIT Madras
- **Ravi Kalwaniya**, IIT Madras
- **V. Adithya**, ISI Delhi

| Volunteers

- **Pranab**, IIT Madras
- **Karthik**, IIT Madras

Invited Speakers

ICDEPRA 2026

Sr. No.	Name	Affiliation
1	Lawrence C. Washington	University of Maryland, USA
2	Michel Waldschmidt	Université Pierre et Marie Curie, France
3	R. Thangadurai	HRI Prayagraj, India
4	B. Sury	ICTS-TIFR Bengaluru, India
5	Hema Srinivasan	University of Missouri, USA
6	Katherine Stange	University of Colorado Boulder, USA
7	Anupam Saikia	IIT Guwahati, India
8	André Leroy	Laboratoire de Mathématiques de Lens (LML), Artois University, France
9	Franz-Viktor Kuhlmann	University of Szczecin, Poland
10	Kálmán Győry	University of Debrecen, Hungary
11	Sanoli Gun	IMSc Chennai, India
12	Sudhir Ghorpade	IIT Bombay, India
13	István Gaál	University of Debrecen, Hungary
14	Kalyan Chakraborty	SRM University AP, India
15	Rupam Barman	IIT Guwahati, India
16	Mohammad Sadek	Sabancı Universitesi, Turkey
17	Patrick Ingram	York University, Canada
18	Sartaj Ul Hasan	IIT Jammu, India
19	Hanson Smith	California State University San Marcos, USA
20	John Charles Saunders	Middle Tennessee State University, USA
21	Sudhansu Sekhar Rout	NIT Calicut, India
22	László Remete	University of Debrecen, Hungary
23	Anwesh Ray	CMI Chennai, India
24	Veekesh Kumar	IIT Dharwad, India
25	Nikita Kalinin	Guangdong Technion-Israel Institute of Technology, China
26	Arkabrata Ghosh	SRM University AP, India
27	Kalyan Banerjee	SRM University AP, India

List of Participants

ICDEPRA 2026

Poster Presentations

Sr. No.	Name	Affiliation
1	Aakash Choudhary	IISER Pune, India
2	Bal Bahadur Tamang	Tribhuvan University, Nepal
3	Darsana N	NIT Calicut, India
4	Drishya T. Das	BITS Pilani KK Birla Goa Campus, India
5	Oais Ahmad Bhat	HRI Prayagraj, India
6	Rudranarayan Padhy	NIT Calicut, India
7	Teena Prajapati	HNB Garhwal University Uttarakhand, India
8	Vikas	BITS Pilani, India
9	Vivek Singh	IIT Dharwad, India

Outstation Participants

Sr. No.	Name	Affiliation
1	Aastha Shukla	IIT Patna
2	Ankita Das	SRM University AP
3	Anubhav Sharma	HRI Prayagraj
4	Anuj Narode	IIT Guwahati
5	Arunabha Mukhopadhyay	No Affiliation
6	Ekta Soni	University of Hyderabad
7	Gyanendra Kumar Verma	IISc Bangalore
8	Himashu Sharma	Tel Aviv University, Israel
9	Jashoda Kumari	IIT Ropar
10	Jeevanantham V	IISER Tirupati
11	Jyotsna Sharma	VIT AP, Amaravati
12	Leena	ISI Delhi
13	Leena Mondal	SRM University AP
14	Manoj Upreti	SRM University AP
15	Mayuresh Mahadeo Londhe	Sabanci Universitesi, Turkey
16	Pallavee Gupta	VIT Vellore
17	Revati Shivanand Divekar	IISER Bhopal
18	Saheli Dutta	ISI Delhi
19	Subham Bhakta	UNSW Sydney, Australia
20	Tanishka Singh	Delhi University
21	Vedhachalam B	IISER Tirupati

Local Participants

Sr. No.	Name	Affiliation
1	Abhradeep Rakshit	IIT Madras
2	Ankana Bhar	IIT Madras
3	Debajyoti De	IIT Madras
4	Divyanshu Kala	IMSc Chennai
5	Drishti Sunder Phukon	CMI Chennai
6	Krithika M	Vel Tech University
7	Manu A Sankaran	IISER Mohali
8	Piyush Kumar Jha	CMI Chennai
9	Shivani	IMSc Chennai
10	Subiksha Kannan	HRI Prayagraj

Sponsors

ICDEPRA 2026

The organizing committee gratefully acknowledges the generous support and contributions from the following institutions and funding agencies, whose assistance has been instrumental in making this conference possible.

- **Indian Institute of Technology Madras**, Chennai, India
- **National Board for Higher Mathematics (NBHM)**, Department of Atomic Energy, Govt. of India.
- **Anusandhan National Research Foundation (ANRF)**, Department of Science and Technology, Govt. of India.
- **Council of Scientific and Industrial Research (CSIR)**, India

Special Issue Announcement

ICDEPRA 2026

The **Journal of Algebra and its Applications (JAA)** will publish a Special Issue dedicated to Professor Sudesh Kaur Khanduja.

Guest Editors

- **André Leroy**, Artois University, France
- **Shanta Laishram**, Indian Statistical Institute Delhi
- **Anuj Jakhar**, Indian Institute of Technology Madras

Submission Guidelines

Authors should use the web submission system of JAA, ensuring they select the special issue. All manuscripts submitted for Professor Khanduja's Special Issue will be peer reviewed and accepted only if they meet the JAA's standards. The published paper will contain a note dedicated to Professor Khanduja.

Handling Editor: Anuj Jakhar, Indian Institute of Technology Madras

Submission Deadline: February 28, 2027 (Sunday)

Conference Schedule

ICDEPRA 2026

Venue: KCB 522, IIT Madras

Time	28.09.2026 (Monday)	29.09.2026 (Tuesday)	01.10.2026 (Thursday)
09:30–10:15	<i>Registration & Inauguration</i>	S. Ghorpade	M. Waldschmidt
10:15–10:55	L. C. Washington	S. Ul Hasan	K. Chakraborty
10:55–11:15	TEA & DISCUSSION BREAK		
11:15–11:55	A. Saikia	M. Sadek	B. Sury
12:00–12:30	N. Kalinin	S. S. Rout	J. C. Saunders
12:35–13:05	A. Ghosh	V. Kumar	K. Banerjee
13:05–14:30	LUNCH BREAK		
14:30–15:10	K. Stange	R. Thangadurai	S. Gun
15:15–15:55	P. Ingram	Poster Session*	A. Ray
15:55–16:15	TEA & SNACKS		

* The poster session on 29 September 2026 (Tuesday) will be held until 16:30. The **Best Poster Awards** will be announced on 2 October 2026 (Friday) during the *valedictory* ceremony.

30 September 2026 (Wednesday)	
09:00–09:40	H. Srinivasan
09:45–10:25	F. V. Kuhlmann
10:30–11:10	A. Leroy
11:10–11:30	TEA BREAK
11:30–13:20	<i>Felicitations</i>
13:20–14:30	LUNCH BREAK

Note: No sessions post lunch on 30 September 2026 (Wednesday).

02 October 2026 (Friday)	
<i>Monogenity and Power Integral Bases</i>	
09:30–10:10	R. Barman
10:15–10:55	L. Remete
10:55–11:20	TEA BREAK
11:20–12:00	H. Smith
12:05–12:35	P. Yadav
12:35–14:00	LUNCH BREAK
14:00–14:40	K. Györy
14:45–15:25	I. Gaál
15:30–16:00	<i>Valedictory Ceremony</i>
16:00–16:30	TEA BREAK

Conference Dinner

30.09.2026 (Wednesday), 19:30 to 21:00

Titles & Abstracts

DAY 1 (28 SEPTEMBER 2026)

Lawrence C. Washington (University of Maryland, USA)

lcw@umd.edu

Title: The class groups in the first two levels of $\mathbb{Z}_3$ -extensions

Abstract: We examine parameter-dependent polynomial families and their Galois groups, irreducibility criteria, and arithmetic dynamics over algebraic number fields.

Anupam Saikia (IIT Guwahati, India)

a.saikia@iitg.ac.in

Title: Stability of class groups in $\mathbb{Z}_2$ -extensions of real quadratic and biquadratic fields

Abstract: We discuss the growth of the 2-class group $A(K_n)$ of the n -th layer K_n in the cyclotomic $\mathbb{Z}_2$ -extension of a number field K . We consider the case when K is a real quadratic or biquadratic field of discriminant having at most four distinct prime factors. We show stability of $A(K_n)$ using tools from class field theory and group theory. In particular, our results imply vanishing of the Iwasawa λ -invariant for these fields as predicted by Greenberg's conjecture. The work to be presented is jointly done with H. Laxmi.

Nikita Kalinin (Guangdong Technion-Israel Institute of Technology, China)

nikaanspb@gmail.com

Title: 2-adic Arithmetic of Square Sandpiles: From Domino Tilings to Chebyshev Polynomials

Abstract: Consider the Abelian sandpile model on the wired $n \times n$ square, and let $L(n)$ be the order in the sandpile group of the configuration having one grain at every nonsink vertex. We determine exactly the power of 2 dividing $L(n)$:

$$\nu_2(L(n)) = \begin{cases} 2, & n = 1, \\ 1, & n \geq 2 \text{ even}, \\ \nu_2(n+1) + 2, & n \geq 3 \text{ odd}. \end{cases}$$

For even n , the result follows from the connection between sandpiles and domino tilings discovered by Florescu, Morar, Perkinson, Salter, and Xu, together with a parity argument. The odd case leads to a rather different and unexpectedly arithmetic picture. Using the symmetries of the square and a unimodular cyclic basis, we reduce the problem to computing the order of 1 in a

quotient of $\mathbb{Z}[X]$ by two shifted Chebyshev polynomials. The relevant invariant is the constant part of this polynomial ideal rather than its determinant. After passing 2-adically, a Euclidean algorithm reduces the problem to consecutive Fibonacci polynomials over $\mathbb{F}_2$, from which the exact valuation follows. I will explain these reductions and the appearance of powers of two in what begins as a combinatorial dynamical system.

Arkabrata Ghosh (SRM University AP, India)

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Title: Rank of a certain family of elliptic curves

Abstract: This article considers the family of elliptic curves given by $E_{p,q} : y^2 = x^3 - pqx$, where p and q are distinct odd primes. More specifically, we show that if $p \equiv 7 \pmod{8}$, $q \equiv 5 \pmod{8}$, and $\left(\frac{p}{q}\right) = -1$, then the ranks of both $E_{p,q}(\mathbb{Q})$ and $E_{p,q}(\mathbb{Q}(i))$ are 0. In the second theorem, we prove that if (i) $p \equiv 3 \pmod{8}$, (ii) $q \equiv 5 \pmod{8}$, (iii) $\left(\frac{p}{q}\right) = -1$, and (iv) $2(p+q)$ is a perfect square, then the rank of $E_{p,q}(\mathbb{Q})$ is 1 and the rank of $E_{p,q}$ over $\mathbb{Q}(i)$ is 2. Finally, by using the BSD and parity conjectures, we prove that if (i) $p \equiv 5 \pmod{8}$, (ii) $q \equiv 3 \pmod{8}$, and (iii) $\left(\frac{p}{q}\right) = -1$, then the rank of $E_{p,q}(\mathbb{Q})$ is 1, and the rank of $E_{p,q}$ over $\mathbb{Q}(i)$ is 2. This work has been published in *Monatshefte für Mathematik*.

Katherine Stange (University of Colorado Boulder, USA)

katestange@gmail.com

Title: Bhargava Cubes

Abstract: I will discuss Gauss composition and Bhargava cubes ($2 \times 2 \times 2$), and generalizations to $n \times n \times n$ cubes. Joint work with Joshua Grochow.

Patrick Ingram (York University, Canada)

pingram@yorku.ca

Title: PCF polynomials in positive characteristic

Abstract: A polynomial is post-critically finite (PCF) if and only if all of its critical points have finite forward orbit under iteration. Results in complex dynamics show that there are no non-trivial algebraic families of PCF polynomials of positive dimension, over a field of characteristic zero. In positive characteristic this is false. The purpose of this talk will be to survey some recent research bounding the dimension of such families in positive characteristic.

Titles & Abstracts

DAY 2 (29 SEPTEMBER 2026)

Sudhir Ghorpade (IIT Bombay, India)

sudhirghorpade@gmail.com

Title: Arithmetic Progressions in Unique Factorization Domains and Dedekind Domains

Abstract: In 1940, Pillai proved that any sequence of consecutive integers with at most 16 terms possesses one term that is relatively prime to all the others. Later Brauer and Pillai showed (independently) that such a result is not true for sequences of length 17 or more. It is not difficult to see that Pillai's theorem generalizes from consecutive integers to arithmetic progressions in the sense that any sequence of 16 (or less) integers in a coprime arithmetic progression (that is, an a.p. for which the first term and common difference is relatively prime) necessarily contains a term that is relatively prime to all the others. We will discuss two algebraic extensions of this Generalized Pillai Theorem in a wider algebraic context.

The first extension, obtained in a joint work with Samrith Ram, is based on the notion of decomposable number of an integral domain, and proves an analogue in the setting of arbitrary integral domains of characteristic zero, where the notion of GCD (and hence of two elements being relatively prime) makes sense. Examples of such GCD domains include unique factorization domains and also rings of entire functions (of a complex variable).

The second extension is a more recent work of A. Jakhar and S. K. Khanduja, and it is in the setting of Dedekind domains of characteristic zero. Here they use an analogous notion of ideal decomposition number, and regard two elements to be relatively prime if the sum of the principal ideals generated by them is the unit ideal.

It may be noted that the two extensions are complementary and neither includes the other. Indeed the situation when the two hypotheses coincide is the relatively easy case of principal ideal domains of characteristic zero.

Sartaj Ul Hasan (IIT Jammu, India)

sartaj.hasan@iitjammu.ac.in

Title: Enumeration of certain permutation group polynomials

Abstract: We construct a new family of permutation group polynomials over finite fields of odd characteristic and explicitly provide its companion. Moreover, we precisely determine the number of permutation group polynomials of this form and those that are equivalent to this new family. In addition, we completely solve the problem of enumerating permutation group

polynomials of the various forms presented in Hasan and Kumar (2026), as well as permutation group polynomials which are equivalent to these families.

Mohammad Sadek (Sabanci Universitesi, Turkey)

mohammad.sadek@sabanciuniv.edu

Title: Base Change of Abelian Varieties

Abstract: Passing from $\mathbb{Q}$ to a finite extension can dramatically alter the arithmetic of an abelian variety defined over $\mathbb{Q}$. In this talk, we describe how the torsion of an elliptic curve over $\mathbb{Q}$ can grow after base change to a number field of small degree. We then explain how this torsion growth forces congruence conditions on the number of points of the reduced curve over finite fields. Finally, we show how an abelian variety defined over $\mathbb{Q}$ can attain everywhere good reduction after a quadratic base change; a phenomenon that never occurs for abelian varieties over $\mathbb{Q}$.

Sudhansu Sekhar Rout (NIT Calicut, India)

sudhansu@nitc.ac.in

Title: Perfect powers with few digits and S -unit coefficients

Abstract: Corvaja and Zannier [Ann. Inst. Fourier (Grenoble) 63(2) (2013), 715–731] proved that only finitely many odd perfect powers have exactly four non-zero digits in their binary expansion. In this talk, we study a generalization of this problem to arbitrary integer bases. We will discuss the finiteness of solutions to

$$y^d = 1 + c_1 g^{m_1} + c_2 g^{m_2} + c_3 g^{m_3}, \quad 0 < m_1 < m_2 < m_3,$$

where the coefficients c_i are S -units. We will also show that, for every fixed base $g \geq 2$, there is a constant $q_0(g)$ such that no perfect q -th power can have five non-zero digits in base g when $q > q_0(g)$ is prime. This talk is based on joint work with Darsana N and Parvathi S. Nair.

Veekesh Kumar (IIT Dharwad, India)

veekeshk@iitdh.ac.in

Title: Linear independence of values of lacunary series at algebraic tuples: An extension of results by Corvaja-Zannier

Abstract: In 2002, Corvaja and Zannier applied the Subspace Theorem to study the arithmetic nature of values of lacunary series at algebraic points, recovering a classical theorem of Mahler. In this talk, I will discuss an extension of their results concerning the linear independence of such values, together with 1 over the field of algebraic numbers. This is joint work with Vivek Singh and Johannes Sprang.

R. Thangadurai (HRI Prayagraj, India)thanga@hri.res.in**Title:** On Lehmer's Problem

Abstract: Lehmer's Problem states that if P is a monic integer coefficient polynomial with no cyclotomic factors in it, then its Mahler measure $M(P) > 1$. Lehmer's problem is known for non-reciprocal polynomials. For reciprocal polynomials, it is open. For two classes of irreducible, monic, reciprocal and non-cyclotomic with integer coefficients, we solve Lehmer's Problem. This is a joint work with Piyush Kumar Jha.

Poster Session**Bal Bahadur Tamang (Tribhuvan University, Nepal)**tamang.bb100@gmail.com

Title: On the Asymptotic Localization and Local Obstructions for the Quadratic Diophantine Equation $x^2 - Dy^2 = N$

Abstract: We study the solvability of the quadratic Diophantine equation $x^2 - Dy^2 = N$, where D is a square-free integer and N is a positive odd integer. By combining asymptotic analysis with local methods, we derive explicit approximation bounds that localize the search for integer solutions (x, y) . These bounds are used to develop an algorithm for testing solvability over large parameter ranges. We show that solvability depends on the arithmetic properties of D and the residue classes of N . In particular, we determine congruence conditions that yield local obstructions to solvability and identify parameter ranges in which solutions exist. We also discuss the role of continued fractions and quadratic reciprocity in the analysis. Keywords: Diophantine equation, solvability, asymptotic analysis, local methods, and approximation bounds.

Aakash Choudhary (IISER Pune, India)aakashchdry1396@gmail.com

Title: Arithmetic progressions of some special elements in finite fields

Abstract: Let q be a prime power and n be a positive integer. Let $\mathbb{F}_{q^n}$ be the degree n field extension over the field $\mathbb{F}_q$. We study the existence of r -primitive elements in an arithmetic progression of length $m \geq 2$. We find a condition for the existence of an element $\alpha \in \mathbb{F}_{q^n}^\times$ for a given $m \geq 2$ and $\gamma \in \mathbb{F}_{q^n}^\times$ such that, for $1 \leq i \leq m$, $\alpha + (i - 1)\gamma \in \mathbb{F}_{q^n}^\times$ is r_i -primitive with prescribed norm $a_i \in \mathbb{F}_q^\times$. Further, we improve this sufficient condition when $q \equiv 3 \pmod{4}$ and the positive integer n is odd. Also, for $n \geq 7, m = 2$ we demonstrate that there are only 41 possible exceptions, and at most 2 exceptions when $q \equiv 3 \pmod{4}$ and n is odd.

Vikas (BITS Pilani, India)p20230056@pilani.bits-pilani.ac.in**Title:** On a variant of Pillai's Problem with k -generalized Fibonacci numbers and powers of b **Abstract:** For an integer $k \geq 2$, let $F^{(k)}$ be the k -generalized Fibonacci sequence. In 2018, Ddamulira, Luca and Rakotomalala considered a variant of classical Pillai's problem and found all integers c with at least two representations as the difference between a k -generalized Fibonacci number and a power of 2. Later in 2020, Ddamulira and Luca found all integers c with at least two representations as the difference between a k -generalized Fibonacci number and a power of 3. We investigate a *uniform* version of this problem by determining integers c that can be represented in at least two ways as the difference between a k -generalized Fibonacci number and a power of b . We employ the theory of linear forms in logarithms of algebraic numbers, to derive effective bounds for all possible solutions of c in terms of b . Finally, all integers having at least two representations of c are completely determined for $b = 5, 6, 7, 10$. This is joint work with Divyum Sharma.**Oais Ahmad Bhat (HRI Prayagraj, India)**bhatoais88@gmail.com**Title:** Algebraic Independence Of Certain Liouville Type Numbers**Abstract:** We investigate the arithmetic nature of numbers defined by lacunary series of the form

$$\alpha_j = \sum_{n=1}^{\infty} \frac{a_{n,j}}{\beta^{u_n}},$$

where β is a Pisot number, $(u_n)_{n \geq 1}$ is a rapidly increasing sequence satisfying $\lim_{n \rightarrow \infty} \frac{u_{n+1}}{u_n} = \infty$, and $(a_{n,j})_{n \geq 1}$ are bounded sequences of integers. We establish a complete characterization of the algebraic independence of such numbers. More precisely, we prove that algebraic independence over $\mathbb{Q}$ is equivalent to the linear independence of $1, \alpha_1, \dots, \alpha_k$ over $\mathbb{Q}(\beta)$, and also to a natural structural condition expressed in terms of an associated invertible integer matrix. We further show that analogous criteria remain valid in the p -adic and function field settings, providing a unified approach to transcendence and algebraic independence for lacunary expansions across the Archimedean, p -adic, and function field settings.

Drishya T. Das (BITS Pilani KK Birla Goa Campus, India)p20230030@goa.bits-pilani.ac.in**Title:** Irreducibility of Generalized Laguerre Polynomials for large integer parameters**Abstract:** Let n be a positive integer. We study the irreducibility of the generalized Laguerre polynomials

$$L_n^{(a)}(x) = \frac{1}{n!} \sum_{j=0}^n \binom{n}{j} \frac{(n+a)!}{(j+a)!} (-1)^j x^j,$$

where $a \in \mathbb{Z}_{\geq 0}$. Earlier works established that these polynomials are irreducible over $\mathbb{Q}$ for $0 \leq a \leq 50$. In this work, we improve these results by establishing that the generalized Laguerre polynomials $L_n^{(a)}(x)$ are irreducible for all $a \leq 1000$. We derive sharper constraints on potential integer roots and make systematic use of the geometry of the associated Newton polygons. This is a joint work with Dutta, Laishram and Nair.

Darsana N (NIT Calicut, India)darsanasri1996@gmail.com**Title:** Prime ideal divisors of parametric recurrence sequences

Abstract: We prove new arithmetic results for parametric linear recurrence sequences specialized at roots of unity, denoted by $(U_n(\zeta))_{n \geq 0}$. In particular, we obtain effective lower bounds for the largest prime ideal divisor and norm of the radical of the principal ideal generated by $U_n(\zeta)$. We further derive an effective upper bound for the S -part of $U_n(\zeta)$, showing that it is strictly smaller than a fixed power of its absolute norm for sufficiently large n .

Rudranarayan Padhy (NIT Calicut, India)padhyrudranarayan1996@gmail.com**Title:** Integral points in backward orbits of a power map on the projective plane

Abstract: Let K be a number field with algebraic closure $\overline{K}$ and let S be a finite set of primes of K containing all the infinite ones. Let φ be a power map on $\mathbb{P}^2$ and $\beta = [1, \beta_1, \beta_2]$ be a fixed element of $\mathbb{P}^2(\overline{K})$ such that $\beta_1 \cdot \beta_2 \neq 0$. Let D be a nonzero effective divisor on $\mathbb{P}^2$, at least one of whose irreducible components is a line *non-degenerate* relative to β . Then we prove that the set of (D, S) -integral points on $\mathbb{P}^2(\overline{K})$, which are in the backward orbit of β , are not Zariski dense in $\mathbb{P}^2$.

Teena Prajapati (HNB Garhwal University Uttarakhand, India)

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Title: Non-Vanishing and Algebraicity of the Rankin-Selberg L-functions.

Abstract: In this article, we investigate the non-vanishing, algebraic, and transcendental nature of the special values of certain L-functions associated to classical automorphic forms inside the critical region. We focus our study to such results associated to the Rankin–Selberg L-functions using a blend of analytic number theory, transcendental methods, and properties of special functions. While several results concerning these properties have been established for L-functions associated with automorphic forms on the critical line, this work extends the analysis inside the critical region. In particular, we extend our study to develop and generalize earlier findings for the Rankin–Selberg, providing new insights into their behavior within the critical region.

Vivek Singh (IIT Dharwad, India)

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Title: S -units and period length of continued fractions of linear recursions

Abstract: Let $(A_n)_{n \in \mathbb{Z}}$ be a linear recurrence sequence with values in a real quadratic field. We will see whether the period length of the continued fraction of A_n is bounded as n varies. The case where $(A_n)_n$ is a linear recurrence of degree 1 has previously been solved by Corvaja and Zannier. Their result settled a problem posed by Mendès France about the length of the periods of the continued fractions for α^n .

This is based on the joint work with Veekesh Kumar and Johannes Sprang.

Titles & Abstracts

DAY 3 (30 SEPTEMBER 2026)

Hema Srinivasan (University of Missouri, USA)

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Title: Betti Numbers of Kunz-Waldi Semigroups are Determinantal

Abstract: If n relatively prime positive integers $1 < a_1 < a_2 < \cdots < a_n$ minimally generate a subsemigroup H , then the ring $R_H = k[t_i^{a_i}, 1 \leq i \leq n]$ is the semigroup ring defined by H . R_H is isomorphic to a $k[x_1, \dots, x_n]/I_H$. The ideal I_H is a toric ideal, i.e., a prime ideal of height $n - 1$ generated by binomials. For this reason, the minimal number of generators of H is called the embedding dimension of H . Betti numbers of H are precisely the Betti Numbers of $k[x_1, \dots, x_n]/I_H$ over the polynomial ring or the Betti numbers of the variety defined by the binomials in I_H . The largest integer not in the semigroup H is called the Frobenius number F_H .

Let $p < q$ be coprime integers. Kunz–Waldi semigroups are numerical semigroups containing p and q and contained in $\langle p, q, r \rangle$, where $2r = p, q, p + q$ whichever is even. We call them $KW(p, q)$ semigroups. Frobenius number of the semigroup $\langle p, q \rangle$ is $pq - p - q$. These are created from the numerical semigroup $\langle p, q \rangle$ by filling in the gaps so that it stays with in $\langle p, q, r \rangle$, taking advantage of the symmetry of $\langle p, q \rangle$. Kunz and Waldi introduced these groups in 2014 and studied many different properties of the groups. They explicitly computed the minimal generators for I_H and showed that it is $\binom{n}{2}$ and the number of Pseudo Frobenius elements is $n - 1$. where n is the embedding dimension. We prove a conjecture on the Betti numbers of the semigroup rings of these semigroups. Namely, if $H \in KW(p, q)$ and is minimally generated by $\{p, q, a_3, \dots, a_n\}$, then the Betti Numbers of the semigroup ring of H are determinantal in the sense that they coincide with those of the ideal of 2×2 minors of a $2 \times n$ generic matrix. Interestingly, these semigroups can be characterized by their principal matrices, a $n \times n$ P matrix with negative entries only on the diagonal such that $P[a_1, \dots, a_n]^T = 0$. As the first step in the proof, we characterize precisely when a $H \in KW(p, q)$ defines a determinantal variety.

Moreover, we also characterize the Apéry posets of Kunz–Waldi semigroups and determine when their tangent cones are Cohen–Macaulay.

Franz-Viktor Kuhlmann (University of Szczecin, Poland)

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Title: Higher ramification theory

Abstract: Ramification theory describes the structural properties of algebraic extensions of valued fields. When applied to the separable algebraic closure of a valued field (K, v) , it yields three fundamental subfields: the absolute decomposition field (the henselization of (K, v)), where

the extension of v to any algebraic extension of K is uniquely determined; the absolute inertia field, which shares the same value group as K , but whose residue field is the separable algebraic closure of the residue field of K ; and the absolute ramification field, which shares the residue field of the absolute inertia field, but whose value group is the divisible closure of the value group of K under all prime components distinct from the residue characteristic of K .

While the absolute ramification field is algebraically closed in residue characteristic 0, in prime residue characteristic $p > 0$ it may fail to be algebraically closed, with the Galois group of its extension to the separable algebraic closure being a p -group. This gives rise to wild ramification, including the defect, which presents a major technical obstacle in long-standing open problems for valued fields of positive residue characteristic, such as local uniformization (the local form of resolution of singularities) and the decidability of the Laurent series field over a finite field with p elements. Consequently, understanding the algebraic extensions of the absolute ramification field is of fundamental importance, forming the core of higher ramification theory.

While one origin of ramification theory lies in number theory – traditionally restricted to discretely valued fields or rank-one valuations – another stems from the theory of ordered fields, where associated valuations can exhibit arbitrarily large value groups. Building on foundational work by Paulo Ribenboim (Math. Ann. 173, 1967; Math. Ann. 185, 1970), this talk examines the construction and computation of ramification ideals. We address the key technical obstacles Ribenboim encountered when dealing with value groups of higher rank and demonstrate how his approach can be generalized, overcoming difficulties currently encountered in modern number-theoretic approaches. Finally, we discuss applications of ramification ideals and explore their explicit connection to the defect phenomenon.

This talk is based on the preprint *Topics in higher ramification theory, I: ramification ideals* (available at <https://fvkuhlmann.de/Fvkprepr.html>).

André Leroy (Artois University, France)

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Title: Polynomial maps and their products

Abstract: The aim of this talk is to present differences that exist between polynomial maps in the commutative case and in the noncommutative case. We will present analogue of classical results and highlight the main differences. A crucial role will be played by the so called “product formula”. A ring will be created around this formula in a very large framework. One of the interesting features is that some additive maps will arise in these broad evaluations. Some examples showing the utility of the ring constructed in the case of many classical rings of polynomials will be presented. We will end the talk pointing out towards possible noncommutative algebraic geometry.

Titles & Abstracts

DAY 4 (01 OCTOBER 2026)

Michel Waldschmidt (Université Pierre et Marie Curie, France)

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Title: On the integers that are represented by multicyclotomic binary forms

Abstract: For $n \geq 1$, let $\phi_n(t)$ be the cyclotomic polynomial of index n ; the degree $\varphi(n)$ of ϕ_n is given by Euler's totient function φ . The cyclotomic binary form of index n is $\Phi_n(X, Y) := Y^{\varphi(n)}\phi_n(X/Y)$. We define a *multicyclotomic binary form* as a product of distinct cyclotomic forms.

In a joint work with Etienne Fouvry, we study the integers that are represented by one at least of these multicyclotomic forms. In particular we give an asymptotic formula, as $N \rightarrow \infty$, for the number of m satisfying $|m| \leq N$ for which there exists a multicyclotomic form Φ of degree ≥ 3 and integers (x, y) with $\max\{|x|, |y|\} \geq 2$ satisfying $m = \Phi(x, y)$.

Kalyan Chakraborty (SRM University AP, India)

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Title: On some classes of Lebesgue-Ramanujan-Nagell equations

Abstract: Finding the solutions of an exponential Diophantine equation is a classical problem and even now it is a very active area of research. One of the most important equations of this type is so-called Lebesgue-Ramanujan-Nagell equation:

$$x^2 + d = \lambda y^n, (x, y, n \in \mathbb{N}, \gcd(x, y) = 1, \lambda = 1, 2, 4)$$

where d is a fixed positive integer.

In this talk, I will discuss some interesting results concerning the positive integer solutions of certain generalizations of the above equation. More precisely, we will discuss the integer solutions of the equation

$$cx^2 + d^{2m+1} = 2y^n, \gcd(x, y) = 1$$

where $c > 1$ is a square-free integer and $d \geq 1$ is an odd integer.

In the last part of the talk, we will discuss some results concerning the positive integer solutions of variants/generalization of the above equations. The last part of this talk is based on a joint work with Azizul Hoque and Kotyada Srinivas.

B. Sury (ICTS-TIFR Bengaluru, India)surybang@gmail.com**Title:** Some families of elliptic curves of ranks 1 and 2 over $\mathbb{Q}$ **Abstract:** Among the curves of the form $y^2 = x^3 + pqx$ with p, q distinct odd primes, we identify several families which have Mordell-Weil rank 1 and rank 2 modulo the parity conjecture. The method is quite elementary.**John Charles Saunders (Middle Tennessee State University, USA)**John.Saunders@mtsu.edu**Title:** On Pell numbers representable as product of two generalized Fibonacci numbers**Abstract:** A generalization of the well-known Fibonacci sequence is the k -Fibonacci sequence with some fixed integer $k > 1$. The first k terms of this sequence are $0, 0, \dots, 1$, and each term afterwards is the sum of the preceding k terms. In this talk, we find all Pell numbers that can be written as product of two k -Fibonacci numbers. The proof of our main theorem uses lower bounds for linear forms in logarithms, properties of continued fractions, and a variation of a result of Dujella and Petho in Diophantine approximation. This work generalizes a prior result of Alekseyev which dealt with determining the intersection of the Fibonacci and Pell sequences, a work of Ddamulira, Luca and Rakotomalala who searched for Pell numbers which are products of two Fibonacci numbers, and a result of Bravo, Gomez and Herrera who found all Pell numbers appearing in the k -Fibonacci sequence.**Kalyan Banerjee (SRM University AP, India)**kalyan484@gmail.com**Title:** Certain diophantine equations and Jacobians of superelliptic curves**Abstract:** In this talk we will introduce certain diophantine equations and discuss the method of solving them by studying Jacobians of superelliptic curves. This work is joint with Kalyan Chakraborty and Ankita Das.**Sanoli Gun (IMSc Chennai, India)**sanoli@imsc.res.in**Title:** On moments of L-functions**Abstract:** In this talk, we will describe a new technique on moments which helps us to deduce lower bound for moments of a large class of L-functions.

Anwesh Ray (CMI Chennai, India)

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Title: A New Approach to Malle's Conjecture via Families of Jacobians

Abstract: Malle's conjecture predicts the asymptotic growth of the number of number fields with prescribed Galois group and bounded discriminant. In this talk, I will describe a geometric approach to lower bounds in Malle's conjecture, based on Galois representations arising from Jacobians in one-parameter families of hyperelliptic curves.

Titles & Abstracts

DAY 5 (02 OCTOBER 2026)

Rupam Barman (IIT Guwahati, India)

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Title: Monogenic Subfields of Certain Cyclotomic Fields

Abstract: In this talk, we investigate the monogeneity and Galois structures of various subfields of cyclotomic fields $K_m = \mathbb{Q}(\zeta_m)$. Recently, Harrington and Jones characterized those m for which the Galois group of the maximal real subfield $K_m^+ = \mathbb{Q}(\zeta_m + \zeta_m^{-1})$ is cyclic. We observe, however, that their characterization does not account for the cases $m \in \{2^n, 4p^n\}$, where p is an odd prime. For completeness, we provide a complete proof covering these cases. We also show that the maximal imaginary subfield $K_m^- = \mathbb{Q}(\zeta_m - \zeta_m^{-1})$ is a proper subfield of index 2 if and only if $4 \mid m$, and we completely characterize those m for which its Galois group is cyclic. Furthermore, we determine the minimal polynomial of $\zeta_m - \zeta_m^{-1}$ for $m \in \{2^n, 4 \cdot 3^n\}$ and apply Dedekind's criterion to prove their monogeneity, thereby providing an alternative proof of results previously obtained by Shah and Nakahara.

László Remete (University of Debrecen, Hungary)

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Title: Monogeneity and power integral bases of quintic fields with Galois group F_{20}

Abstract: A classic and well-developed algorithm is known for computing the generators of a power-integral basis in a given number field. Unfortunately, the algorithm's runtime depends exponentially on the unit rank of the number field, so it cannot be applied efficiently in practice for higher-degree cases. Using a recent result by István Gaál, the number of units can be reduced, and by moving to integer arithmetic, the code's execution can be significantly accelerated. We present this method for number fields with Galois groups isomorphic to the Frobenius group of order 20.

Hanson Smith (California State University San Marcos, USA)

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Title: Number Fields with Arbitrarily Large Minimal Index

Abstract: For a number field $K/\mathbb{Q}$, the minimal index is the least positive integer m for which there exists a monogenic order with index m in the maximal order. Loosely speaking, the minimal index measures how close the maximal order is to being monogenic. This talk will survey recent work of the speaker that, for any $n > 2$ and $N > 1$, constructs infinitely many number fields of degree n with minimal index greater than N .

Prabhakar Yadav (Sabanci Universitesi, Turkey)

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Title: Index of Polynomial Compositions

Abstract: In this talk, we will discuss the monogenity of polynomial compositions and some recent results in this direction. We will also discuss related questions concerning discriminants, iterates, and analytic aspects of polynomial families. This is a joint work with Jakhar, Laishram and Kalwaniya.

Kálmán Györy (University of Debrecen, Hungary)

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Title: Effective reduction theory of integral polynomials of given discriminant and its applications

Abstract: For polynomials in $\mathbb{Z}[X]$, the classical $\mathbb{Z}$ -equivalence (monic case) and $GL_2(\mathbb{Z})$ -equivalence preserve the discriminant as an invariant. The effective reduction theory for integral polynomials of given degree and discriminant consists of results that give, for a given polynomial $f \in \mathbb{Z}[X]$, a $\mathbb{Z}$ -equivalent (in the monic case) or $GL_2(\mathbb{Z})$ -equivalent polynomial $g \in \mathbb{Z}[X]$ whose coefficients are effectively bounded above in terms of only the degree and discriminant of f . We discuss the effective results of this type on quadratic and cubic polynomials, implied by work of Lagrange (1773) and Hermite (1851), the general ineffective theorem of Birch and Merriman (1972), the general effective theorem of Györy (1973) for monic polynomials, obtained independently, and that of Evertse and Györy (1991) for arbitrary polynomials. The proofs of these two effective theorems use Györy's effective results on unit equations, which were proved by means of Baker's effective theory of logarithmic forms. Later Evertse, Györy and others obtained several applications and generalizations; see the book Evertse and Györy (2017). In his long-forgotten paper Hermite (1857), Hermite attempted to extend the above results of Lagrange and Hermite to polynomials of arbitrary degree. However, as was pointed out in our joint work with Bhargava, Remete and Swaminathan (2023), Hermite (1857) proved an important result but with a weaker equivalence only. Thus, it was only by the above mentioned theorems of Györy (1973) and Evertse and Györy (1991) that Hermite's problem from 1857 was settled in full generality. This and many other recent results inspired us to write our survey paper *Effective reduction theory of integral polynomials of given discriminant, and related topics*, arXiv:2409.02627v2 (2025). In our talk we briefly overview some generalizations and several applications of the effective reduction theory, among others to monogenicity and rational monogenicity of number fields and orders, power integral bases and canonical number systems in number fields, classical Diophantine equations, irreducible polynomials and Hermite equivalence of polynomials. This is a joint survey with J.-H. Evertse, featuring some new joint results with R. von Känel.

István Gaál (University of Debrecen, Hungary)

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Title: Monogeneity and power integral bases

Abstract: Monogeneity is a classical area of algebraic number theory that continues to be actively researched. In the talk we collect several results obtained over the past few years in this area. Several of the listed results were presented at the series of online conferences titled “Monogeneity and Power Integral Bases”. We also give a collection of the most important methods used in several of these papers.

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