XXXVII Ohio Mathematics Conference
The Ohio State University, Columbus, Ohio
July 17-19, 2026

CONFERENCE INFORMATION

ORGANIZERS

Mohamed Yousif, The Ohio State University, Lima, Ohio
Sergio R. López-Permouth, Ohio University, Athens, Ohio
Viet Dung Nguyen, Ohio University, Zanesville, Ohio
Franco Guerriero, Ohio University, Lancaster, Ohio
Cosmin Roman, The Ohio State University, Lima, Ohio

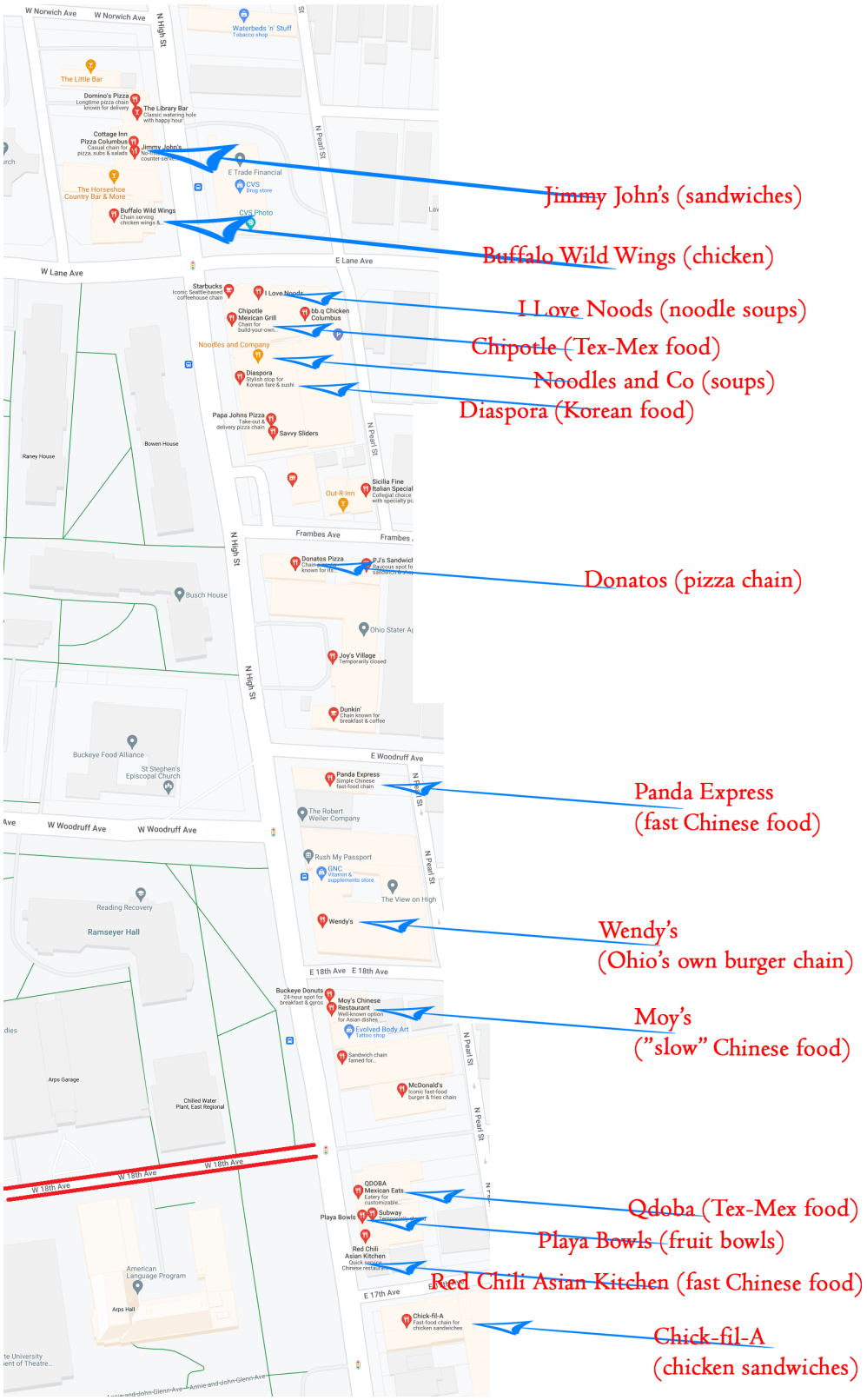
XXXVII Ohio Mathematics Conference
The Ohio State University, Columbus, Ohio
July 17-19, 2026

RING THEORY

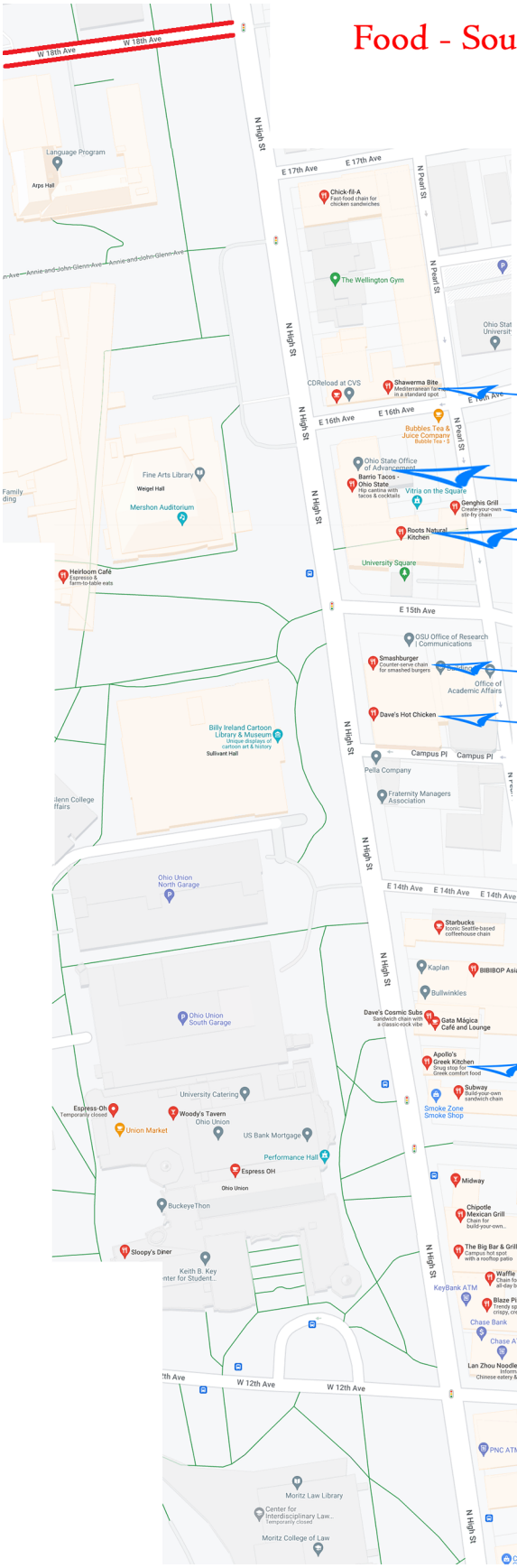
PROGRAM & ABSTRACTS

Food places at ≤ 15 min walk from Math Dept. (Eastward on 18th Ave)

Food - North of 18th Ave



Food - South of 18th Ave



Shawerma Bite (mediterranean)

Bario Tacos

Genghis Grill (build your own stir fry)

Roots Natural Kitchen (vegan bowls)

Smashburger (Colorado burger chain; ask the chef for less salt!)

Dave's Hot Chicken (Nashville-style chicken; may not be open yet)

Bibibop (fast Korean food, build-your-own-bibimbap)

Apollo's Greek Kitchen

Ethyl & Tank (Southwestern food)

Blaze Pizza

Jersey Mike's Subs (sandwiches)

Friday, July 17, 2026

11:00 AM - 12:15 PM	**Registration - Math Tower 7^{th} -MW- 724**
	RING THEORY, FRIDAY AFTERNOON SESSION
PLENARY	(Math Annex -EA- 170)
12:20-12:25 PM	**Opening remarks.**
12:30-1:10 AM	Ashish SRIVASTAVA (Saint Louis University) [zoom] **Plenary Talk - Quivers with quantum Yang-Baxter equation and Hecke condition: Deformation of face algebras**
1:20-1:40 PM	I. AGYEI (Ohio University)[in-person] **Factorization of Irreducible polynomials into products of entangled polynomials**
1:45-2:05 PM	Volodymyr BAVULA (University of Sheffield) [zoom] **Analogue of the Galois Theory for arbitrary finite field extensions**
2:10-2:30 PM	Gurmeet Kaur BAKSHI (Panjab University, Chandigarh) [in-person] **Understanding Simple Components in Rational Group Algebras**
2:35-3:15 PM	Manuel REYES (University of California, Irvine) [zoom] **Plenary Talk - Generalized hyperrings and their applications**
PARALLEL I	(Math Annex -EA- 160) (continued on next page)

	RING THEORY, FRIDAY AFTERNOON SESSION
PARALLEL I	(Math Annex -EA- 160)
3:25-3:45 PM	Ishfaq DAR (Shanghai University) [zoom] **One General Formula to Bound Them All**
3:50-4:10 PM	Hasitha GEEKIYANAGE (Texas Tech University) [zoom] **An Algebraic Analogue of Swan's Local-to-Global Extension Lemma**
4:15-4:35 PM	Cody Stenberg HANSEN (Ohio University) [in-person] **Entangled Laurent series**
PARALLEL II	(Math Annex -EA- 170)
3:25-3:45 PM	Martha Lizbeth Shaid SANDOVAL-MIRANDA [zoom] (Universidad Autónoma Metropolitana) **Galois Connections and Preradicals in Abelian Categories**
3:50-4:10 PM	Alexander SISTKO (SUNY New Paltz) [in-person] **Proto-Abelian Categories Associated to Matroids over Partial Algebraic Structures**
4:15-4:35 PM	Jesús VILLAGÓMEZ (IMate-UNAM) [zoom] **Towards An Abstract Comultiplication Theory and Applications**
PLENARY	(Math Annex -EA- 160)
4:40-5:20 PM	Pace P. NIELSEN (Brigham Young University) [in-person] **Plenary Talk - Algebraization of infinite summation**

Saturday, July 18, 2026

	RING THEORY, SATURDAY MORNING SESSION
PLENARY	(Math Annex -EA- 160)
9:00-9:40 AM	André LEROY (Université d'Artois) [zoom] **Plenary Talk - Polynomial-Like Maps and Ring Actions**
PARALLEL I	(Math Annex -EA- 160)
9:50-10:10 AM	Vijay KUMAR (Chandigarh University) [zoom] **On some generalized sequence spaces**
10:15-10:35 AM	Rasoul MORADI (Razi University) [zoom] **Rings over which every module is purely (quasi-)continuous modules**
10:40-11:00 AM	Najmeh DEHGHANI (Persian Gulf University) [zoom] **On centrally (quasi-)morphic modules**
11:05-11:25 AM	Yasser TOLOOEI (Razi University) [zoom] **Some generalizations of C_2 (C_3) modules**
11:30-11:50 AM	Ayten KOÇ (Gebze Technical University) [zoom] **A Noncommutative Nullstellensatz for Leavitt Path Algebras**
11:55-12:15 PM	Müge KANUNİ (Özyeğin University) [zoom] **Quotients of Leavitt path Algebras over Rings by I-basic graded ideals**
PARALLEL II	(Math Annex -EA- 170) (continued on next page)

PARALLEL II	(Math Annex -EA- 170)
9:50-10:10 AM	Avanish Kumar CHATURVEDI (University of Allahabad) [zoom] **Some variants of semiclean rings**
10:15-10:35 AM	Manoj Kumar PATEL (National Institute of Technology Nagaland)[zoom] **A comprehensive study on chain conditions in Rings and Modules**
10:40-11:00 AM	Nirbhay KUMAR (Feroze Gandhi College) [zoom] **On a generalization of central reflexive rings**
11:05-11:25 AM	Derya Keskin TÜTÜNCÜ (Hacettepe University) [zoom] **Some Results on Simple-Direct-Injective Modules**
11:30-11:50 AM	Javid GULUZADA (Ankara University) [zoom] **A new class of polar elements in rings**
11:55-12:15 PM	Tuğba PAKEL (Ankara University) [zoom] **A Study of the Mitsch Partial Order on Modules**
12:20-1:40 PM	Lunch Break

Saturday, July 18, 2026

	RING THEORY, SATURDAY AFTERNOON SESSION
PLENARY	(Math Annex -EA- 160)
1:50-2:30 PM	Yiqiang ZHOU (Memorial University of Newfoundland) [in-person] **Plenary Talk - An embedding theorem and a fitting form lemma for triangular matrix rings**
PARALLEL I	(Math Annex -EA- 160)
2:40-3:00 PM	Robert POP (Babeş–Bolyai University) [zoom] **Precover completing domains in exact categories**
3:05-3:25 PM	Zachary MESYAN (University of Colorado) [in-person] **Quantales Arising From Rings**
3:30-3:50 PM	Mihai STAIC (Bowling Green State University) [in-person] **Applications of Determinant-like Maps**
3:55-4:15 PM	Ganygong LEE [in-person] (The Ohio State University/Chungnam National University) **Rudimentary rings as structural matrix rings**
4:20-4:40 PM	Yuanlin LI (Brock University) [zoom] **On almost strongly regular rings**
4:45-5:05 PM	Mauricio MEDINA-BÁRCENAS[in-person] (Universidad Autónoma Metropolitana) **Finite reduced rank in $\sigma[M]$**
PARALLEL II	(Math Annex -EA- 170) (continued on next page)

PARALLEL II (Math Annex -EA- 170)

2:40-3:00 PM — Ahmed LAGHRIBI (Artois University) [zoom]
Symbol length and the 3-Pfister number

3:05-3:25 PM — José Manuel FRESNEDA (University of Murcia) [zoom]
Weakly Sigma-cotorsion rings

3:30-3:50 PM — Fahad SIKANDER (Saudi Electronic University) [in-person]
Extended Projectivity Classes in QTAG-Module

3:55-4:15 PM — Sudesh Kaur KHANDUJA (IISER Mohali) [in-person]
Discriminant and Integral Basis of Number Fields defined by Exponential Taylor Polynomials

4:20-4:40 PM — Jeremy EDISON (Milwaukee School of Engineering) [in-person]
Generalized Reed-Muller Codes Using Quiver Representations Over $\mathbb{F}_1$

4:45-5:05 PM — Md Shamim AKHTER [zoom]
(King Fahd University of Petroleum and Minerals)
Nonlinear θ-bi-skew Lie(triple) centralizer on $*$-algebras

BANQUET
6:30 PM
Khaab Indian Kitchen and Bar
Village Pointe Center, 230 W Olentangy St., Powell, OH 43065
phone: (614) 376-0951, link: www.khaabindiankitchenandbar.com/

Sunday, July 19, 2026

RING THEORY, SUNDAY MORNING SESSION

PARALLEL I (Math Annex -EA- 160)

9:00-9:20 AM Adnan ABBASI (VIT Bhopal University) [zoom]
A Characterization of Multiplicative Left Bi-Skew Jordan-Type Generalized Derivations on $*$−Algebras

9:25-9:45 AM Shakir ALI (Aligarh Muslim University) [zoom]
Derivations and related maps in rings with involution

9:50-10:10 AM Leila HEIDARI ZADEH (Islamic Azad University) [zoom]
Supercentralizing Additive Maps and Derivations on Generalized Quaternion Rings

10:15-10:35 AM Sumandeep KAUR (Shanghai University) [zoom]
On a conjecture of Lenny Jones about certain monogenic polynomials

10:40-11:00 AM Kishor PAWAR [zoom]
(Kavayitri Bahinabai Chaudhari North Maharashtra University)
On Intra Regular Γ-Semihyperring

11:05-11:25 AM Dimple RANI (Panjab University) [zoom]
One-Sided Strongly π-Regular Elements and Kaplansky's Question

PARALLEL II (Math Annex -EA- 170)
(continued on next page)

PARALLEL II	(Math Annex -EA- 170)
9:00-9:20 AM	Ali JABALLAH (University of Sharjah) [zoom] **Determining Intermediate Rings in Some Extensions of Integral Domains**
9:25-9:45 AM	Gurninder SANDHU (Patel Memorial National College) [zoom] **Commutativity criteria for prime rings with involution via pairs of endomorphisms**
9:50-10:10 AM	Pratibha S KSHIRSAGAR [zoom] (Dr. Vishwanath Karad MIT-World Peace University) **A Graph Associated to Non Semi-Essential Ideals of a Lattice**
10:15-10:35 AM	Manh Thang VO (Ohio University) [zoom] **New Quasi-Cyclic Codes from Entangled Polynomial Rings**
10:40-11:00 AM	Mohd AZEEM (Aligarh Muslim University) [zoom] **Constructing Reversible DNA Codes: An Algebraic Perspective**
11:05-11:25 AM	Ravi SRIVASTAVA (National Institute of Technology Sikkim) [zoom] **On g-extra connectivity of corona-type graph products**
11:30 AM-12:30 PM	Lunch Break

Sunday, July 19, 2026

RING THEORY, SUNDAY AFTERNOON SESSION

PLENARY	(Math Annex -EA- 160)
12:40-1:20 PM	Pınar AYDOĞDU (Hacettepe University) [in-person] **Plenary Talk - Ring Structures of Graph Magma Algebras**
PARALLEL I	(Math Annex -EA- 160)
1:30-1:50 PM	Fatma EBRAHIM (Ohio University) [in-person] **Congeniality and Amenability of Bases for Matrix Algebras**
1:55-2:15 PM	Jonathan Henry BROWN (University of Dayton) [in-person] **Intermediate subalgebas of Quasi-Cartan Inclusions**
2:20-2:40	Delfino NOLASCO (Ohio University) [zoom] **TBA**
PARALLEL II	(Math Annex -EA- 170)
1:30-1:50 PM	Mohammad Salahuddin KHAN (Aligarh Muslim University) [in-person] **Generalized derivations associated with identities related to prime ideal**
1:55-2:15	Hai DINH (Kent State University) [zoom] **Classifications of skew constacyclic codes via isometry classes**
2:20-2:40	Djoudi Kheir Eddine RAMI (University of BBA) [zoom] **On an approach to deal with non standard optimal control problem**
2:45 PM	Final Remarks

A Characterization of Multiplicative Left Bi-Skew Jordan-Type Generalized Derivations on $*-$Algebras

ADNAN ABBASI, VIT Bhopal University

Let A be an unital $*$-algebra. In this paper, the authors explored that every multiplicative left bi-skew Jordan-type generalized derivation $G : A \to A$ associated with a multiplicative left bi-skew Jordan-type derivation $T : A \to A$ is additive. Moreover, it is shown for all $A \in A$ that G is of the form $G(A) = A) + \mu A$, where $\mu \in CI$. As applications, we obtain the concrete form of G on factor von Neumann algebras, prime $*$-algebras, von Neumann algebras with no central summands of type I1.

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Factorization of Irreducible polynomials into products of entangled polynomials

ISAAC AGYEI, Ohio University

We explore an extension of the algebra of polynomials on a single variable, recently introduced by López-Permouth and Pallone, called algebras of m-nomials and entangled polynomials. We are motivated by the fact that there may exist non-trivial factorizations of irreducible polynomials within the context of entangled polynomials. We are interested in the notion of a positive integer n ($n \in \mathbb{Z}^+$) such that $f(x)$ $n-$nomial is reducible. The valence is the smallest $n \times n$ matrix such that it is possible to write the $f(x)$ $n-$nomial as the product of two nonunits in $K^n[x]$.

The valence can also be infinity if no such n exists. It was shown in Ashley and Lopez's paper.

that linear polynomials have infinite valence. We explore possible ways in which the degree of a polynomial can influence its valence. We present, as a key element, how the determinant of a polynomial, when viewed as an n-nomial via a finitistic representation also introduced in Ashley and Lopez's Paper, helps determine the moment when irreducibility is lost. In this study, we focus on cases in which the underlying fields are rational or finite. We are also motivated to study valence in the broader class of cyclotomic polynomials.

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Nonlinear θ-bi-skew Lie(triple) centralizer on $*$-algebras

MD SHAMIM AKHTER,
King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia.

Let $\mathcal{S}$ be a $*$-algebra over the complex field $\mathbb{C}$. Let

$$[k,l]_\theta = kl^* - \theta lk^*$$

denote the θ-bi-skew Lie product of elements $k, l \in \mathcal{S}$, where θ is a nonzero scalar. In this talk, we generalize the results in [1,2,3] and discuss the following. We show that under mild assumptions, if $\alpha : \mathcal{S} \to \mathcal{S}$ (not necessarily linear) is a nonlinear θ-bi-skew Lie centralizer (that is, α satisfies

$$\alpha([k,l]_\theta) = [\alpha(k), l]_\theta$$

for all $k, l \in \mathcal{S}$), then α is an additive $*$-centralizer, satisfies

$$\alpha(\theta k) = \theta\alpha(k),$$

and is of the form

$$\alpha(k) = z_0 k$$

for every $k \in \mathcal{S}$ and some $z_0 \in \mathcal{Z}(\mathcal{S})$ (the center of the algebra $\mathcal{S}$).

Further, we introduce the concept of nonlinear generalized θ-bi-skew Lie derivations and prove that every nonlinear generalized θ-bi-skew Lie derivation

$$\mathcal{G}_\delta : \mathcal{S} \to \mathcal{S}$$

is of the form

$$\mathcal{G}_\delta(k) = z_0 k + \delta(k),$$

where $\delta : \mathcal{S} \to \mathcal{S}$ is an additive $*$-derivation.

Furthermore, we introduce the notions of nonlinear θ-bi-skew Lie triple centralizers and nonlinear generalized θ-bi-skew Lie triple derivations on $\mathcal{S}$ analogously and study them. We also provide some applications of our main results.

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Derivations and related maps in rings with involution

SHAKIR ALI, Aligarh Muslim University

Let R be an associative ring. An additive mapping $D : R \to R$ is said to be a derivation if $D(xy) = x)y + xD(y)$ holds for all $x, y \in R$. An additive mapping $D : R \to R$ is said to be a Jordan derivation if $D(x^2) = x)x + xD(x)$ holds for all $x \in R$. An additive mapping $D : R \to R$ is said to be a Jordan *-derivation if $D(x^2) = x)x^* + xD(x)$ holds for all $x \in R$, where R is a ring with involution *. For $n \geq 2$, it is easy to show (by induction) that if D is a derivation of a ring R, then D satisfying the following relation

$$D(x^n) = \sum_{i=0}^{n-1} x^i D(x) x^{n-i-1} \text{ for all } x \in R. \tag{1}$$

where $x^0 y = y x^0$ for all $x, y \in R$.

This functional equation is known as the *"n^{th}-power property"*. The study of such mappings were initiated by Bridges and Bergen [1]. In 1984, they proved that such type of map exhibiting n^{th} power property is a derivation on R, when R is a prime ring with identity and when *char* $R > n$ or is zero. In the year 2007, Lanski [4] generalized this result from derivations to generalized derivations in semiprime rings. Recently, author together with Dar [2] introduced the notion of *"n^{th}-power *- property"* and studied these results in the setting of rings with involution. Precisely, an analogous result for Jordan *-derivations on prime rings with involution was obtained by author together with Dar [2] (see also [3] for more related results).

In this talk, we will discuss the recent progress made on the topic and related areas. Precisely, we describe the structure of maps involved in the functional equation (1). Finally, we conclude our talk with some recent open problems.

Bibliography.

1. Bridges, D., Bergen, J. (1984). On the derivation of x^n in a ring. *Proc. Amer. Math. Soc.*, **90**, 25–29.

2. Dar, N. A., Ali, S. (2021). On the structure of generalized Jordan $*$-derivations of prime rings, *Comm. Algebra*, **49**(4), 1422-1430.

3. Jeelani, M., Alhazmi, H., Singh, K. P. (2021). On n^{th} power $*$-property in $*$-rings with applications, *Comm. Algebra*, **49**(9), 3961-3968.

4. Lanski, C. (2007). Generalized Derivations and n^{th} Power Maps in Rings, *Comm. Algebra*, **35**(11), 3660-3672.

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Ring Structures of Graph Magma Algebras

PINAR AYDOĞDU, Hacettepe University

Graph magma algebras arise from a very concrete idea: a directed graph is used to prescribe the multiplication of a basis. In this talk, we discuss how such elementary combinatorial data can lead to rich ring-theoretic and representation-theoretic structures.

We focus on two natural graph-based multiplication rules. In the one-value case, a product either returns the first factor or becomes zero. Associativity imposes strong restrictions on the graph, leading to a normal form for associative one-value graph magma algebras. We explain how the Jacobson radical, socles, projective modules, and certain Kasch-type properties can be read directly from this graph-theoretic description. In the semiperfect case, the corresponding Gabriel quiver has a star-shaped form, reflecting the role of nilpotent and idempotent vertices.

We then turn to the two-value case, where every product chooses one of its two factors. Here associativity leads to a block-line decomposition of the graph into complete and null blocks. By adjoining the identity as a vertex, we obtain graph monoids and their monoid algebras. The resulting algebras are controlled by a signed invariant, the block signature, which determines the projective structure, direct product decompositions, and the Gabriel quiver. In particular, these algebras admit radical-square-zero presentations by block-line quivers.

Overall, the talk illustrates how the ring structure of graph magma algebras is governed by simple but surprisingly rigid combinatorial patterns.

This is a joint work with Gülhan Mısra Bayer and Bülent Saraç. This study was supported by The Scientific and Technological Research Council of Türkiye (TÜBİTAK) under the Grant Number 122F105.

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Constructing Reversible DNA Codes: An Algebraic Perspective

MOHD AZEEM, Department of Mathematics, Aligarh Muslim University

Abstract. DNA codes satisfying algebraic and biological constraints are fundamental in DNA computing and DNA-based data storage systems, where reversibility and reverse-complement properties help to reduce undesirable hybridization [1,2,3]. In this paper, we propose a new algebraic construction of reversible and reverse-complement DNA codes derived from any $k \times n$ matrix of rank k, where n, k, and t are positive integers. The construction is based on the concept of double-reflected matrices over a finite commutative ring with unity R and the finite field $F_{4^{2t}}$.

Motivation. The key motivation of our research is that we can generate reversible and reversible DNA codes using any $k \times n$ matrix with rank k. Moreover, this approach enables the determination of a lower bound for the distance before completing the whole calculation process.

Main results. In this subsection, we present the main results concerning the construction of reversible and reverse-complement codes obtained from double-reflected matrices. The resulting codes are shown to preserve dimension while achieving an improved minimum distance.
Theorem. Let M be a $k \times n$ matrix over the ring R with $rank(M) =$. Then, the reversible code $C = angleM \mid M''\rangle$ has $[2n, k, d']$ parameters, where $d' \geq 2d$, $\langle M\rangle$ is a $[n, k, d]$-code and M'' is the double-reflected matrix of $M =_{ij}]$, that is, $M'' =_{ij}]$ with $b_{ij} = (m - i + 1)(n - j + 1)$.
Theorem. Let $C' = angleM\rangle$ and $C'' = angle(M'')^{\circ 4^t}\rangle$ be two $[n, k, d]$-code over $F_{4^{2t}}$. Then, the code $C = angleM \mid (M'')^{\circ 4^t}\rangle$ is a $[2n, k, d']$-linear code over $F_{4^{2t}}$ with $d' \geq 2d$, and $\Phi(C)$ corresponds to a reversible DNA code. Here, Φ is the DNA corresponding map used in [5].

Overview and main contributions. The matrix-theoretic framework developed in this work yields two practical construction principles. First, for any full-rank $k \times n$ matrix M over the ring R, the concatenated code $\langle M \mid M''\rangle$ is reversible and has parameters $[2n, k, d']$ with a guaranteed lower bound $d' \geq 2d$, where $[n, k, d]$ are the parameters of $\langle M\rangle$. Second, over $F_{4^{2t}}$, the Frobenius-Hadamard lift preserves the base parameters, and the DNA correspondence Φ maps $\langle M \mid (M'')^{\circ 4^t}\rangle$ to a reversible DNA code, in the spirit of lifted polynomial constructions for DNA coding [5,6]. The examples provided in this work further show that AMDS/MDS instances arise naturally and that a non-reversible linear code may still correspond to a reversible DNA code under Φ. Computational verification and parameter optimization can be efficiently carried out using computer algebra systems such as Magma [4].
Bibliography.

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4. W. Bosma and J. Cannon, *Handbook of Magma Functions*. Sydney, NSW, Australia: Univ. of Sydney, 1995.

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6. E. S. Oztas and I. Siap, "On a generalization of lifted polynomials over finite fields and their applications to DNA codes," Int. J. Comput. Math., vol. 92, no. 9, pp. 1976–1988, 2015.

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Understanding Simple Components in Rational Group Algebras

GURMEET KAUR BAKSHI, Panjab University, Chandigarh, India

Understanding the Wedderburn decomposition of rational group algebras and the structure of their simple components is a classical problem connecting group theory, ring theory, and number theory. In this talk, we present a new framework based on generalized strong Shoda pairs that yields explicit crossed product descriptions of simple components. This approach leads to constructive versions of the Brauer–Witt theorem and provides effective tools for computing Schur indices. Applications to large classes of monomial groups and explicit examples will be discussed

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Analogue of the Galois Theory for arbitrary finite field extensions

VOLODYMYR BAVULA, University of Sheffield, UK

An answer to an old question is given: What is Galois Theory for arbitrary finite field extensions? For purely inseparable field extensions, Jacobson (1937, 1944) established the exponent-one case, with further generalizations to modular extensions due to Sweedler (1968) and Gerstenhaber–Zaromp (1970).

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Intermediate subalgebas of Quasi-Cartan Inclusions

JONATHAN HENRY BROWN, University of Dayton

Abstract Let $D \subseteq A$ be a quasi-Cartan pair of algebras. Then there exists a unique discrete groupoid twist $\Sigma \to G$ whose twisted Steinberg algebra is isomorphic to A in a way that preserves D. In this talk, we show there is a lattice isomorphism between wide open subgroupoids of G and subalgebras C such that $D \subseteq C \subseteq A$ and $D \subseteq C$ is a quasi-Cartan pair. We also characterize which algebraic diagonal/algebraic Cartan/quasi-Cartan pairs have the property that every subalgebra C with $D \subseteq C \subseteq A$ has $D \subseteq A$ a diagonal/Cartan/quasi-Cartan pair. In the diagonal case, when the coefficient ring is a field, it is all of them. Beyond that, only pairs that are close to being diagonal have this property. This work is joint with A. Fuller and L. Orloff-Clark.

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Some variants of semiclean rings

AVANISH KUMAR CHATURVEDI,
Department of Mathematics, University of Allahabad

Nicholson introduced the notion of clean rings in 1977. During the period, many authors studied these notions and also generalized these notions in many ways. Y. Ye introduced the notion of semiclean rings by using periodic elements in place of idempotents in the definition of clean elements. An element of a ring is called a *semiclean element* if it is sum of a unit and a periodic element of the ring. A ring is called a semiclean ring if every element of the ring is semiclean. Here, we plan to discuss some recent developments in these notions.

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One General Formula to Bound Them All

ISHFAQ DAR,
Department of Mathematics and Newtouch Center for Mathematics, Shanghai University

Finding where the zeros of a polynomial live is a fundamental problem, but it becomes significantly trickier when the polynomials are over non-commutative quaternions. Existing bounds are often limited to specific cases, like those using standard Fibonacci or Leonardo numbers. In this talk, I'll introduce a powerful new framework that uses the extended (k,t)-Fibonacci sequence to create a highly flexible "shell" that guarantees to contain all zeros of a given quaternion polynomial. I will show how a single theorem, by simply tuning the parameters k and t, can reproduce and significantly sharpen previously known bounds based on k-Fibonacci, k-Leonardo, Pell, and Lucas numbers. You'll leave with a clear view of how this unified approach not only simplifies the field but also provides demonstrably tighter estimates for polynomial zero localization.

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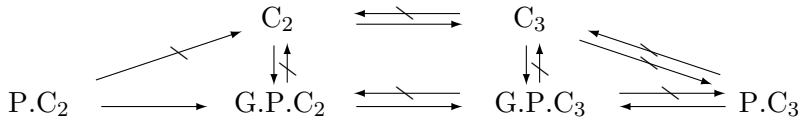
Some generalizations of C_2 (C_3) modules

YASSER TOLOOEI, Razi University

The notion of extending modules was generalized to purely extending modules by John Clark in 1998. An R-module M is said to be *purely extending (or* $P.C_1$*)* if every submodule of M_R is essential in a pure submodule. In this paper, we introduce pure analogues of the C_2 and C_3 properties. Specifically, we define a module M_R to be *purely* C_2 *(denoted by* $P.C_2$*)* (resp. *generalized purely* C_2*, denoted by* $G.P.C_2$*)* if every submodule isomorphic to a pure submodule (resp. direct summand) of M_R is itself pure. Furthermore, we say that M_R satisfies the *purely* C_3 (resp. *generalized purely* C_3, denoted by $G.P.C_3$) property if the sum of any two independent pure submodules (resp. direct summands) of M_R is a pure

submodule. In addition, we establish that G.P.$C_2 \Rightarrow$ G.P.C_3, whereas the converse does not hold in general. The following diagram illust rates these implications and highlights the irreversibility of certain relationships:



Focusing on modules satisfying the P.C_1 condition, we investigate their general properties and the interrelations among the following classes:

- M_R is *purely continuous* (or *p.continuous*) if it satisfies both P.C_1 and P.C_2.
- M_R is *purely quasi-continuous* (or *p.quasi-continuous*) if it satisfies both P.C_1 and P.C_3.
- M_R is *generalized purely continuous* (or *g.p.continuous*) if it satisfies both P.C_1 and G.P.C_2.
- M_R is *generalized purely quasi-continuous* (or *g.p.quasi-continuous*) if it satisfies both P.C_1 and G.P.C_3.

Furthermore, we demonstrate that every quasi-continuous module is p.quasi-continuous, and every quasi-injective module is p.continuous. A comprehensive study of these modules is provided, along with several established properties.

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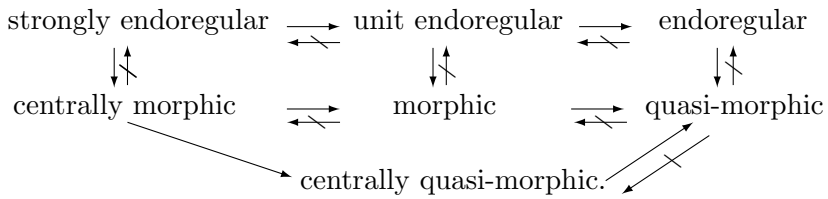
On centrally (quasi-)morphic modules

NAJMEH DEHGHANI, Persian Gulf University

This paper investigates centrally (quasi-)morphic modules as a natural generalization of centrally morphic rings. An R-module M is defined as *centrally quasi-morphic* if, for every endomorphism $f \in \mathrm{End}_R(M)$, there exist central elements $g, h \in \mathrm{End}_R(M)$ such that $\ker(f) = extIm(g)$ and $\mathrm{Im}(f) = er(h)$. Furthermore, M is termed *centrally morphic* if $g =$ satisfies the given conditions. A ring R is said to be *right (left) centrally (quasi-)morphic* if R_R ($_RR$) is centrally (quasi-)morphic. We prove that R is right centrally morphic if and only if it is right centrally quasi-morphic. Furthermore, modules whose endomorphism rings are regular (resp., unit-regular or strongly regular) are termed *endoregular* (resp. *unit-endoregular* or *strongly endoregular*). While it is known that every endoregular module is quasi-morphic and every unit-endoregular module is morphic, we show that every st rongly endoregular module is centrally morphic. Finally, these relationships are summarized in a diagram, and we provide illustrative examples demonstrating that these implications are not generally reversible.



We demonstrate that for image-projective modules, the notions of centrally morphic and centrally quasi-morphic coincide, and we further establish that every centrally quasi-morphic module is abelian. Regarding semisimple modules, we prove that a module M_R is centrally (quasi-)morphic if and only if it is strongly endoregular, which is equivalent to the condition that every homogeneous component of M_R has length 1. Additionally, we provide a complete characterization of centrally (quasi-)morphic modules that are direct sums of cyclic modules over principal ideal domains. Finally, we establish various structural properties of modules satisfying these conditions.

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Classifications of skew constacyclic codes via isometry classes

HAI DINH, Kent State University

Isometries provide a rigorous basis for classifying skew constacyclic codes, as they preserve the Hamming distance and the essential algebraic structure. However, the current isometry theory for skew constacyclic codes is largely confined to a fixed field automorphism, despite the fact that codes defined by different automorphisms can be isometric. This leaves a structural gap in the classification of skew constacyclic codes. In this talk, we close this gap by developing a more general isometry framework that allows the automorphism parameter to vary. We define isometries between skew (θ_1, λ_1)- and skew (θ_1, λ_1)-constacyclic codes over the finite field $\mathbb{F}_{p^m}$ with p^m elements, where p is a prime and m is a positive integer, via Hamming-distance-preserving $\mathbb{F}_{p^m}$-module homomorphisms between the associated quotient modules. Here, each θ_i is an automorphism of $\mathbb{F}_{p^m}$, and each λ_i is a nonzero element of $\mathbb{F}_{p^m}$. We establish necessary and sufficient conditions for the existence of such isometries and classify the resulting equivalence relation on the full parameter space by giving a complete set of representatives. As immediate consequences, we obtain necessary and sufficient conditions describing when skew constacyclic codes collapse to major subclasses, including constacyclic, skew cyclic, and cyclic codes. Examples are included to demonstrate the effectiveness of the theory.

Joint work with Nhan T.V. Nguyen and Nguyen K. Tung.

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Congeniality and Amenability of Bases for Matrix Algebras

FATMA EBRAHIM, Ohio University

In this talk, we focus on the algebras $M_n(A)$ of matrices over a commutative infinite-dimensional F-algebra A, where F is an arbitrary field. We extend the study of amenability and congeniality of bases in a natural non-commutative direction. Faced with an abundance of bases for these algebras exhibiting mixed levels of complexity, we begin our study by focusing on modular bases. In characterizing amenability and congeniality in this context, we uncover a new relation, which we call *amenable congeniality*. This relation becomes a central ingredient in characterizing both the amenability of modular bases and congeniality among modular bases. Amenable congeniality also appears to be worthy of consideration in its own right, and we therefore discuss it extensively in this talk.

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Generalized Reed-Muller Codes Using Quiver Representations Over $\mathbb{F}_1$

JEREMY EDISON, Milwaukee School of Engineering

We discuss a generalization of classical Reed-Muller codes using representations of quivers over $\mathbb{F}_1$, the field with one element. In particular given a quiver Q, an $\mathbb{F}_1$ representation V of Q, and a natural number r, we construct the binary code $\mathrm{RM}_Q(r, V)$. In the case that V is a semisimple representation with m simple components, we recover the usual Reed-Muller code $\mathrm{RM}(r, m)$. In this talk, we will give an overview of representation theory over $\mathbb{F}_1$ and detail the construction of the codes $\mathrm{RM}_Q(r, V)$. We will give some preliminary results on the minimum distance and block length for equi-oriented type A quivers and discuss directions for future research. This is joint work with Alex Sistko.

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Weakly Sigma-cotorsion rings

JOSÉ MANUEL FRESNEDA, University of Murcia

A well-known result due to Chase establishes that a ring R is right coherent if and only if every direct product of projective left R-modules is flat. On the other hand, flat modules are known to form the left-hand class of a complete cotorsion pair, and the modules in the right-hand class of such a cotorsion pair are known as cotorsion modules. This flat-cotorsion pair was an essential tool in the proof of the Flat Cover Conjecture see [1].

In this talk, we consider a dual situation to Chase's theorem, i.e. we characterize the class of rings for which every direct sum of injective left R-modules is a cotorsion module. We call these rings *left weakly* Σ*-cotorsion rings*. Among other interesting properties, these rings arise naturally in the study of the (lack of) balance of the right derived functors of the Hom functor associated with flat resolutions.

Noetherian and perfect rings are trivial examples of left weakly Σ-cotorsion rings, but we present many other nontrivial examples. In fact, we consider the more general situation of rings for which every direct sum of injective modules has cotorsion dimension $\leq n$, which we call *left weakly* n-Σ*-cotorsion rings*. A major breakthrough in the study of these rings is based on an extension of a result see [2, Theorem 3.3] due to Šaroch and Štovíček concerning the first-order-theoretic nature of Σ-cotorsionness.

This talk is part of joint work with Manuel Cortés-Izurdiaga and Sergio Estrada (see [3]).

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An Algebraic Analogue of Swan's Local-to-Global Extension Lemma

HASITHA GEEKIYANAGE, Texas Tech University

The Serre–Swan correspondence provides a connection between algebra and geometry. It identifies vector bundles with finitely generated projective modules: in algebraic geometry, locally free sheaves of finite rank on an affine scheme correspond to finitely generated projective modules over its coordinate ring. In topology, vector bundles over a compact Hausdorff space correspond to finitely generated projective modules over $C(X)$. In this talk, we will give an algebraic analogue for Swan's extension lemma which needed to prove the Serre-Swan correspondence.

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A new class of polar elements in rings

JAVID GULUZADA, Ankara University

Let R be a ring with unity. In this paper, we introduce and study the notion of *quasipolarity along an element* in rings, which extends the classical concept of quasipolar elements and is closely connected to generalized Drazin invertibility. We present several equivalent characterizations of quasipolarity along an element and establish the uniqueness of the associated quasi-spectral idempotent. Furthermore, we introduce the concept of *quasi-invertibility along an element* and prove that it is equivalent to quasipolarity along an element. We also show that an element a is quasipolar along an element d if and only if da is generalized Drazin invertible. In addition, we investigate the dual notion of quasipolarity along an element and prove that it coincides with quasipolarity along an element. Finally, we examine its relationships with J-quasipolarity and generalized inverses, together with its invariance under similarity transformations and several consequences of Cline's formula.

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Entangled Laurent series

CODY STENBERG HANSEN, Ohio University

Entangled polynomials $k^m[x]$ were first described by López and Pallone for a field k, then extended to general entangled polynomials $R^m[x]$ by Lee, Leroy, and López, as subrings of the set of row and finite matrices $RCF(R)$. These were then found to be isomorphic to certain subrings of $M_m(R[x])$ and the skew polynomial ring $(R^m)[t;\pi]$, where π is a cyclic automorphism of R^m. We extend these findings to the ring of formal Laurent series $R((x))$ and construct the ring of entangled Laurent series $R^m((x))$.

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Supercentralizing Additive Maps and Derivations on Generalized Quaternion Rings

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Let $\mathcal{A} = \alpha, \beta(\mathcal{S})$ be a generalized quaternion ring over an arbitrary unital ring $\mathcal{S}$, and let $Z_s(\mathcal{A})$ denote its supercenter. In this paper, we investigate additive maps and derivations on generalized quaternion rings with a particular focus on supercentralizing behavior. We characterize the structure of supercentralizing additive maps on $\mathcal{A}$ and show that every such map is proper. Furthermore, we study supercentralizing derivations on $\mathcal{A}$ and prove that every supercentralizing derivation is identically zero. These results contribute to a better understanding of structure-preserving mappings on quaternion-type rings and extend previous results in the literature.

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Determining Intermediate Rings in Some Extensions of Integral Domains

ALI JABALLAH, University of Sharjah

Intermediate rings in ring extensions have been always a subject of study from different aspects. We are interested in this research in extensions of integral domains with sets of intermediate rings satisfying some finiteness conditions. We establish in this work a process that provides the list of intermediate rings in the general setting of extensions $R \subset Q$ of integral domains with only finitely many intermediate rings with R integrally closed in S. The main tool of this work: A family of polynomials that are useful in determining and computing the number of intermediate rings.

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Quotients of Leavitt path Algebras over Rings by I-basic graded ideals

MÜGE KANUNİ, Özyeğin University

In this talk, the Leavitt path algebra is constructed over a commutative ring R. It is stated that the quotient of the Leavitt path algebra on a row-finite graph by an arbitrary (basic or non-basic) graded ideal is isomorphic to a direct sum of Leavitt path algebras over suitable graphs. A graded ideal function φ on the extended set of vertices, is defined as a tool to obtain the result. Furthermore, the quotient of a Leavitt path algebra of an arbitrary graph by an I-basic graded ideal is isomorphic to the Leavitt path algebra on a suitable graph over the quotient ring R/I. Examples are given to illustrate both results.

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On a conjecture of Lenny Jones about certain monogenic polynomials

SUMANDEEP KAUR, Shanghai University

To know whether a monic irreducible polynomial is monogenic or not is one of the important problems in algebraic number theory. In an attempt to answer this problem for certain family of polynomials, L. Jones in [Bull. Aust. Math. Soc. 100 (2019), 239-244] conjectured that if $\gcd(n, mB) =$ and A is a prime number, then the polynomial $x^n + A(Bx + 1)^m \in \mathbb{Z}[x]$ with $n \geq 3$ and $1 \leq m \leq n - 1$, is monogenic if and only if $n^n + (-1)^{n+m}B^n(n - m)^{n-m}m^mA$ is square-free. In this talk using Dedekind Criterion and classical results from algebraic number theory, we will see that this conjecture is true.

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Generalized derivations associated with identities related to prime ideal

MOHAMMAD SALAHUDDIN KHAN, Aligarh Muslim University

Abstract: Let R be a ring with an involution denoted by $*$, and let P be a prime ideal of R. An additive mapping $d : R \to R$ is called a derivation of R if it satisfies the condition $d(xy) = x)y + xd(y)$ for all $x, y \in R$. A generalized derivation of R is an additive mapping $F : R \to R$ such that $F(xy) = x)y+xd(y)$ for all $x, y \in R$. This paper explores the structure of the quotient ring R/P in relation to the action of generalized derivations on the prime ideal P of R. In particular, we investigate the relationship between the commutativity of this class of rings and the generalized derivations that satisfy various algebraic identities involving prime ideals.
Keywords: Derivation, generalized derivation, involution, prime ideal, quotient ring.

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Discriminant and Integral Basis of Number Fields defined by Exponential Taylor Polynomials

SUDESH KAUR KHANDUJA , IISER Mohali

Let $K_n = \mathbb{Q}(\alpha_n)$ be a family of algebraic number fields, where $\alpha_n \in \mathbb{C}$ is a root of the nth exponential Taylor polynomial

$$\frac{x^n}{n!} + \frac{x^{n-1}}{(n-1)!} + \cdots + \frac{x^2}{2!} + \frac{x}{1!} + 1, \qquad n \in \mathbb{N}.$$

In this lecture, we shall give a formula for the exact power of any prime p dividing the discriminant of K_n in terms of the p-adic expansion of n. We shall also describe an explicit p-integral basis of K_n for each prime p. These p-integral bases lead naturally to the construction of an integral basis of K_n.

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On an approach to deal with non standard optimal control problem

DJOUDI KHEIR EDDINE RAMI, University of BBA

The aim of this presentation is to develop an analytically tractable Riccati-based framework for TIDLQ problems that preserves the essential structural properties of classical linear quadratic control theory. To this end, we introduce a novel formulation that replaces the traditional non-symmetric Riccati equation derived in open-loop setting with a generalized Riccati system exhibiting an intrinsic symmetric structure. The proposed ansatz is based on a refined variational analysis of the original time-inconsistent control problem. By performing a suitable decoupling technique of the value function, we derive a system of coupled matrix equations governing the equilibrium behavior. These relations are then embedded into a generalized Riccati framework that restores symmetry and positivity properties without imposing restrictive assumptions on the underlying problem data.Withing this symmetric Riccati setting, we establish the local well-posedness of the resulting generalized Riccati e quation. The analysis relies on a contraction mapping argument, allowing the application of Banach's fixed point theorem. As a direct consequence, we prove the local existence and uniqueness of solutions to the symmetric Riccati system. Moreover, by the established equivalence between the original TIDLQ problem and equilibrium Riccati equation, we deduce the local existence and uniqueness of a linear equilibrium open-loop control.

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A Noncommutative Nullstellensatz for Leavitt Path Algebras

AYTEN KOÇ, Gebze Technical University

Hilbert's Nullstellensatz states that a quotient of the algebra of polynomial functions on an algebraic variety over an algebraically closed field is the algebra of polynomial functions on a (sub)variety if and only if its radical is trivial. A noncommutative analogue is: "A quotient of a Leavitt path algebra over an algebraically closed field is isomorphic to a Leavitt path algebra if and only if its radical is trivial (KoÇ-Özaydın)". This suggests that a Leavitt path algebra behaves like a noncommutative algebra of polynomial functions on a directed graph. (Based on research partially supported by the TÜBİTAK grant 122F414.)

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A Graph Associated to Non Semi-Essential Ideals
of a Lattice

PRATIBHA S KSHIRSAGAR, Dr. Vishwanath Karad MIT-World Peace University

The concept of the non-semi-essential ideal graph of a lattice L is introduced. In this graph, the vertex set consists of all nonzero non-semi-essential ideals of L, and two vertices are adjacent if their join is a non-semi-essential ideal of L. The relationship between the algebraic properties of L and the graph-theoretic properties of its associated graph is investigated.

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On a generalization of central reflexive rings

NIRBHAY KUMAR , Department of Mathematics, Feroze Gandhi College

We introduce the notion of $\mathcal{H}$-reflexive rings, which lies strictly between the classes of central reflexive rings and J-reflexive rings. In support, we give several examples and counterexamples. We find that the notions of reflexive, central reflexive, $\mathcal{H}$-reflexive, and J-reflexive rings are equivalent for the class of J-semisimple rings. We also show that the notions of $\mathcal{H}$-reflexive and central reflexive rings are equivalent for the class of rings with no nil ideals.

We prove that a ring R is $\mathcal{H}$-reflexive if and only if, for every $a, b \in R$,

$$\langle a\rangle\langle b\rangle = 0 \quad \Longrightarrow \quad \langle b\rangle\langle a\rangle \subseteq T(R),$$

where $T(R)$ denotes the hypercenter of R. We also give several characterizations of $\mathcal{H}$-reflexive rings with the help of their extension rings. Finally, we discuss some of their basic properties and their relationship with the class of Armendariz rings.

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On some generalized sequence spaces

VIJAY KUMAR , Chandigarh University

In present talk we focus on some generalized sequence spaces under gradual norm defined by ideals. We present some of their topological properties in the framework of gradual norm.

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Symbol length and the 3-Pfister number

AHMED LAGHRIBI, Artois University

Let F be a field of characteristic 2, $W_q(F)$ the Witt group of nonsingular quadratic forms over F, and $W(F)$ the Witt ring of symmetric bilinear forms over F. For any integer $m \geq 2$, let $I_q^m(F)$ denote the subgroup $I^{m-1}(F) \otimes W_q(F)$ of $W_q(F)$, where $I^n(F)$ is the n-th power of the fundamental ideal IF of $W(F)$ (we take $I_q^1(F) = q(F)$). Any quadratic form $\phi \in I_q^m(F)$ is Witt equivalent to a sum of forms similar to m-fold Pfister forms. The m-Pfister number of ϕ, denoted by $\mathrm{Pf}_m(\phi)$, is the least number of forms similar to m-fold Pfister forms needed to express ϕ up to Witt equivalence. Our aim in this talk is to discuss the case $m =$ by giving a formula that bounds $\mathrm{Pf}_3(\phi)$ for any ϕ. The case where ϕ is of dimension 14 will be detailed. (This talk is based on joint work with Trisha Maïti).

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Rudimentary rings as structural matrix rings

GANYGONG LEE, The Ohio State Univeristy/Chungnam National University

In 1945, Nathan Jacobson [2] introduced the notion of primitive rings and established a fundamental structure theorem for them, analogous to the classical Wedderburn–Artin theorem for semisimple Artinian rings. A key ingredient in the study of primitive rings is the existence of a faithful simple module.

More recently, Lee, Roman, and Zhang [3] introduced the broader class of rudimentary rings, which properly contains the class of primitive rings. A ring R is called *right rudimentary* if it admits a faithful right R-module M whose endomorphism ring $\mathrm{End}_R(M)$ is a division ring. Equivalently, R admits a faithful indecomposable endoregular right module.

Structural matrix rings form an important class of subrings of full matrix rings. They are determined by a preorder on the index set and were systematically studied by van Wyk [4] beginning in 1988. Earlier, Clark [1] showed that matrix-unit semigroups naturally give rise to semigroup algebras that can be realized as matrix rings.

In this talk, I will show that structural matrix rings coincide with the matrix rings arising from matrix-unit semigroups. I will then present a characterization of rudimentary structural matrix rings. Finally, I will discuss enumeration results, including counts of structural matrix rings, rudimentary structural matrix rings, and their isomorphism classes.

This is joint work with Sangmin Chun, Mauricio Medina-Bárcenas, and Cosmin S. Roman.

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Polynomial-Like Maps and Ring Actions

ANDRÉ LEROY, Université d'Artois

Inspired by the product formula that appears while evaluating polynomials from $R = t;\sigma,\delta]$ (K a division ring), M. Aryapoor defined a ring structure on the set of maps from K to K. We first remark that considering the polynomials from $K\,[t_1;\sigma_1,\delta_1]\ldots[t_n;\sigma_n,\delta_n]$, we can similarly define a ring structure on the maps from K^n to K. We then define, more generally, a ring structure on maps from a set X into a ring R when R, acts on X. This general frame allows us to consider polynomial like functions for various situations taking X to be a division ring, a module, a filtered rings,...with various actions. We then recover some features of polynomial maps. In particular, we can define semi-invariant polynomials, compute the inverse of these maps, and also get basic algebraic geometry correspondence in this general frame. The sets of zeros of the functions can also be analyzed in the way it is done for the case of polynomials.

This is a joint work with Huda Merdach.

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On almost strongly regular rings

YUANLIN LI, Brock University

A ring R is called almost strongly regular (ASR) if for each $a \in R$; either a or $1-a$ is strongly regular. The class of almost strongly regular rings lies properly between the class of strongly regular rings and the class of strongly clean rings. In this talk, we discuss basic properties and the structure of almost strongly regular rings, especially for (formal triangular) matrix rings and group rings.

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Finite reduced rank in $\sigma[M]$

MAURICIO MEDINA-BÁRCENAS, Universidad Autónoma Metropolitana

In 1982 John Beachy gave a general definition of rings with finite reduced rank extending that of Goldie for Noetherian rings. In this talk I will present how this notion can be taken further to categories $\sigma[M]$ where M is an R-module.

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Quantales Arising From Rings

ZACHARY MESYAN, University of Colorado

It is well-known that the ideals of a ring form a multiplicative lattice, or quantale. Other types of subobjects of a ring, such as subgroups and submonoids, likewise form quantales, but have received much less attention. We discuss the additive submonoid quantale of an arbitrary ring, with particular focus on the question of which properties of the ring can be recovered from it. We show that this quantale, unlike the ideal quantale, captures significant information about the cardinality, characteristic, and center of the ring. Certain rings, such as non-prime finite fields, torsion-free rings, and those with characteristic 2, are completely determined by their submonoid quantales.

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Rings over which every module is purely (quasi-)continuous modules

RASOUL MORADI, Razi university

We study four purity-based generalizations of the classical conditions C_2 and C_3 for modules, We defined the following notions on M_R:

- *Purely* C_2 (*or* P.C_2): if a submodule A of M_R is isomorphic to a pure submodule of M_R, then A is also a pure submodule of M_R.
- *Generalized purely* C_2 (*or* G.P.C_2): if a submodule A of M_R is isomorphic to a direct summand of M_R, then A is a pure submodule of M_R. (These modules were called purely C_2 in literature).
- *Purely* C_3 (*or* P.C_3): if A_1 and A_2 are pure submodules of M_R with $A_1 \cap A_2 =$, then $A_1 \oplus A_2$ is a pure submodule of M_R.
- *Generalized purely* C_3 (*or* G.P.C_3): if A_1 and A_2 are direct summands of M_R with $A_1 \cap A_2 =$, then $A_1 \oplus A_2$ is a pure submodule of M_R.
- We call purely extending modules, in the sense of J. Clark, P.C_1 *modules.*

The module M_R is called *purely continuous* (*or p.continuous just for short*) if M_R has both P.C_1 and P.C_2, and *purely quasi-continuous* (*or p.quasi-continuous*) if it has P.C_1 and

$P.C_3$. Moreover, we call M_R *generalized purely continuous* (*or g.p.continuous*) if it has $P.C_1$ and $G.P.C_2$ and it is called *generalized purely quasi-continuous* (*or g.p.quasi-continuous*) whenever it has $P.C_1$ and $G.P.C_3$. Our main result characterizes von Neumann regular rings as precisely those over which every (finitely generated) module satisfies any of these properties. In contrast, we show that rings over which every (finitely generated) module has the C_2 or C_3 property are exactly the semisimple Artinian rings. We also characterize rings whose finitely cogenerated modules are C_2 or C_3, and we investigate when projective modules satisfy these purity conditions. Several illustrative examples are provided.

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Algebraization of infinite summation

PACE P. NIELSEN, Brigham Young University

An algebraic framework to study infinite sums is proposed, complementing and augmenting the usual topological tools. The framework subsumes numerous examples in the literature. It is developed using varied examples, with a particular emphasis on infinitizing the usual group and ring axioms. Comparing these examples reveals that a few key algebraic properties play a crucial role in the behaviors of different forms of infinite summation. Special attention is given to associativity, which is particularly difficult to properly infinitize. In that context, there is an important technique called the Eilenberg-Mazur swindle that is studied and greatly generalized.

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A Study of the Mitsch Partial Order on Modules

TUĞBA PAKEL, Department of Mathematics,
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This study focuses on the Mitsch order on modules and investigates its basic properties using endomorphism rings. Just like in semigroups and rings, we show that the Mitsch order is also a partial order on modules. We also compare the Mitsch order with several other orders on modules, such as the Jones, minus, direct sum and space orders. In addition, we discuss the lattice properties of the Mitsch order and examine its compatibility with addition and scalar multiplication.

This is a joint work with T.P. Calci, S. Halicioglu, A. Harmanci, B. Ungor. The speaker is supported by The Scientific and Technological Research Council of Türkiye (TÜBİTAK).

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A comprehensive study on chain conditions in Rings and Modules

MANOJ KUMAR PATEL, National Institute of Technology Nagaland

In this talk we would like to explore the study of ascending/ descending chain condition of variants of module and ring structures and their significance in generalizing classical results. Here we will try to explore several relationship of these modules with injective/ projective modules. Further, we will focus on well-known Hopkins-Levitzki theorem and dual of Hilbert's Basis theorem.

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On Intra Regular Γ-Semihyperring

KISHOR PAWAR,
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In this paper we have investigated the intra-regular Γ-semihyperring R and presented its characterizations while exploring the properties of Γ-hyperideals of R. We have also studied the Γ-semihyperring which is both regular and intra-regular and proved some results in this regard. We have investigated converse of some results and provided counter examples as well.

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Precover completing domains in exact categories

ROBERT POP, Babeş–Bolyai University

Precover completing domains generalize subprojectivity domains in additive (exact) categories. This is the setting in which study objects having a minimal precover completing domain. We also give some closure properties for precover completing domains and derive applications to finitely accessible categories (in particular, to module categories).

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One-Sided Strongly π-Regular Elements and Kaplansky's Question

DIMPLE RANI, Panjab University, Chandigarh

In *Transactions of the American Mathematical Society*, Vol. 68 (1950), Kaplansky raised the following question:

> It is natural to ask what can be deduced from the assumption $a^{n+1}x = n$. For example, does this assumption enable one to construct idempotents?

In this talk, we discuss the subsequent developments and the current status of both the local and global versions of this question.

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Generalized hyperrings and their applications

MANUEL REYES, University of California, Irvine

Hyperrings are a generalization of rings in which the sum of two elements consists of a set of elements, rather than a single element. These arise from ordinary rings as quotients by equivalence relations, such as the action of the multiplicative group $k^\times$ of a field on a k-algebra. Although these structures and their modules are quite flexible in their application, they do not form well-behaved categories.

To repair this situation, we generalize hyperrings to a class of new objects called *hoops* by omitting the axiom of associativity for addition. The resulting categories of hoops and their modules are very well-behaved, admitting many universal constructions that do not exist for hyperrings. We will discuss how these techniques lead to a "base-free" representation theory of ordinary rings on projective geometries.

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Commutativity criteria for prime rings with involution
via pairs of endomorphisms

GURNINDER SANDHU, Patel Memorial National College

Let R be a prime ring (not necessarily commutative) with involution $*$ of the second kind, center $Z(R)$, and let $E_1, E_2 : R \to R$ be endomorphisms of R. The aim of this article is to examine the identities

$$E_1(x)E_2(x^*) + q\,\alpha(xx^*) \in Z(R)$$

for all $x \in R$, where $q \in \{1, -1\}$ and $\alpha \in \{I_R, *\}$, with I_R denoting the identity map of R. It is shown that each of these identities forces R to be commutative. Moreover, suitable examples justifying the hypotheses are given.

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Galois Connections and Preradicals in Abelian Categories

MARTHA LIZBETH SHAID SANDOVAL-MIRANDA,
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In [1], [2], Bican, Kepka, Nemec and Jambor established that every equivalence between categories of modules $R-$Mod and $S-$Mod induces an isomorphism between $R-$pr and $S-$pr, the corresponding lattices of preradicals. In [3] this result is generalized to the fact that every adjoint pair between two categories of modules induces a Galois connection between the corresponding lattices of preradicals. In this talk, we step further in the generalization, proving that every adjoint pair (F, G) between locally small abelian categories $\mathcal{A}$ and $\mathcal{B}$ induces a Galois connection (φ, ψ) between the corresponding collections $Pr(\mathcal{A})$ and $Pr(\mathcal{B})$ of preradicals. As a consequence, we have the result described at the beginning of this introduction in the context of abelian categories: every equivalence induces an order isomorphism between the collections of preradicals. We also study preradicals in the opposite category $\mathcal{A}^{op}$ and define the duality assignment Δ between both collections of preradicals, which is an order anti-isomorphism that exchanges both operations and both type of preradicals, idempotent and radicals. Finally, we will present a pair of examples, where the lattice of idempotent radicals is described completely. In the first one we consider the category of left Λ-modules, where Λ is a pat h algebra. In the second one, it is considered the category of torsion abelian groups. This is a report of [4], joint work with: *Rogelio Fernández-Alonso (UAM, Iztapalapa Campus, Mexico), Janeth Magaña (UAM, Azcapotzalco Campus, Mexico), Valente Santiago-Vargas (UNAM, Mexico)*

Keywords: Galois connections, adjoint pairs, preradicals, lattices

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Extended Projectivity Classes in QTAG-Module

FAHAD SIKANDER, Saudi Electronic University

This paper introduces and systematically investigates the class of *weakly $\mathscr{W}_1^n$-projective* modules within the framework of QTAG-modules. We demonstrate that this new class constitutes a proper generalization of the previously studied $\mathscr{W}_1^n$-projective modules. Key results include decomposition theorems and characterizations that establish fundamental connections between weak projectivity, pillared modules, and n-layered modules. Furthermore, we extend these findings using ordinal-indexed α-n-summability conditions, proving that a weakly balanced $\mathscr{W}_1^n$-projective module which is α-n-summable is precisely a pillared module.

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Proto-Abelian Categories Associated to Matroids
over Partial Algebraic Structures

ALEXANDER SISTKO, SUNY New Paltz

The notion of an abelian category is indispensable to modern algebra. Recently, examples of categories whose objects lack traditional algebraic structure, but which retain crucial aspects of abelian categories, have caught the attention of researchers in algebraic geometry, combinatorics, and representation theory. Several competing notions of this phenomenon are known as proto-abelian categories. In this talk, we discuss matroids over idylls as a particular instance of this trend. We show that a proto-abelian structure exists on the category of matroids over a perfect idyll, generalizing known results for matroids. We also show that a similar structure exists on a certain category of sheaves over a tropical toric variety, allowing one to recover their Harder-Narasimhan filtrations from a categorical lens. Time permitting, we also discuss ongoing work to understand representations of quivers in proto-abelian categories. Joint work with Jaiung Jun and Cameron Wright.

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Quivers with quantum Yang-Baxter equation and Hecke condition:
Deformation of face algebras

ASHISH SRIVASTAVA, Saint Louis University

In this paper we initiate the study of quivers carrying quantum Yang–Baxter and Hecke structure, and we apply this framework to study path algebras over quivers whose loop spaces carry RTT relations determined by Hecke R-matrices. We show that the quantum matrix algebra $\mathcal{O}_q(M_n)$ is isomorphic as a bialgebra to the face algebra over a rose quiver deformed by RTT relations of the $GL_q(n)$ Hecke R-matrix. (This is a joint work with Cody Gilbert)

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On g-extra connectivity of corona-type graph products

RAVI SRIVASTAVA, National Institute of Technology Sikkim, India

Connectivity is an important concept in graph theory, especially in the design of reliable and fault-tolerant networks. The notion of g-extra connectivity describes the ability of a network to tolerate failures by ensuring that, after the removal of certain vertices or edges, every remaining connected component contains at least g + 1 vertices.

This work studies both vertex and edge versions of g-extra connectivity for several corona-type graph products, including the edge corona, neighbourhood corona, subdivision neighbourhood corona, and rooted graph products. A correction to an earlier result on the g-extra edge connectivity of the corona product is also presented. These results help in understanding the robustness of graph products and their applications in modeling reliable networks.

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Applications of Determinant-like Maps

MIHAI STAIC, Bowling Green State University

In this talk, we present two applications of a family of determinant-like maps $det^{S^r} : V_d^{\otimes\binom{rd}{r}} \to k$. We show that det^{S^r} provides a criterion for determining whether a d-partition of the complete r-uniform hypergraph K^r_{rd} forms a spanning hypertree partition. We also examine the relationship between the map det^{S^2} and the 2-equilibrium condition associated with Newton's third law of motion. This is joint work with Steven Lippold and Alin Stancu.

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Some Results on Simple-Direct-Injective Modules

DERYA KESKIN TÜTÜNCÜ, Hacettepe University

Let R be a ring. A right R-module M is called a *simple-direct-injective* module if, whenever A and B are simple submodules of M with $A \cong B$ and B a direct summand of M, then A is a direct summand of M. In this talk, firstly we will give some new characterizations of these modules. Secondly, the structure of simple-direct-injective modules over a commutative Dedekind domain will be fully determined. Finally, some relevant counterexamples will be given to show that being simple-direct injective for rings is not left-right symmetric.

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Towards An Abstract Comultiplication Theory and Applications

JESÚS VILLAGÓMEZ, IMate-UNAM

On this talk we discuss the progress of dualizing the classical theory of prime ideals of a (possibly noncommutative) ring, developing properties of coprime ideals and the coprime spectrum from the lattice-theoretic and preradical perspectives of Bican–Kepka–Němec and Raggi–Ríos–Wisbauer.

More precisely, for a ring R, a two-sided ideal C is coprime if

$$C \subseteq I \quad \text{or} \quad C \subseteq J,$$

whenever

$$C \subseteq (I :_R J),$$

where

$$(I :_R J) = \bigcap \{f^{-1}[J] : f \in \mathrm{End}_R(R),\ I \subseteq \mathrm{Nuc}(f)\}.$$

Finally, we will see applications to module theory and new characterizations of rings.

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New Quasi-Cyclic Codes from Entangled Polynomial Rings

MANH THANG VO, Ohio University

Quasi-cyclic codes form an important class of linear codes that generalize cyclic codes while retaining rich algebraic structure and practical flexibility. In this talk, we introduce a new construction of quasi-cyclic codes arising from entangled polynomial rings. Motivated by recent developments on m-nomials and entangled algebraic structures, we consider entangled versions of quotient rings of the form $F[x]/\langle x^n - 1\rangle$. Within this framework, suitable left and right ideals naturally produce quasi-cyclic codes; we refer to these codes as shuffle-cyclic codes. The talk will present the main motivation, basic construction, and coding-theoretic significance of this new family, while also pointing toward ongoing work on their algebraic structure, parameters, and potential applications.

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An embedding theorem and a fitting form lemma for triangular matrix rings

YIQIANG ZHOU, Memorial University of Newfoundland

We review an Embedding Theorem, and present a new Fitting Form Lemma. These results suggest new approaches for handling triangular matrix rings. They are applied to proving results on the strong clean property, the strong 2-sum property, and the Hirano-Tominaga property of triangular matrix rings.

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Hope to see you again in 2028!