

# PROGRAM

**Southern Regional Algebra Conference (SRAC 2020)**

Milledgeville, Georgia, USA

March 20-22, 2020



**Organizing Committee**

Prof. Robert Blumenthal (Dept. Chair)

Dr. Guy R. Biyogmam

Dr. Simplicie Tchamna

Fran Sanford (Admin. Asst.)

## **List of Participants**

1. Sima Ahsani (Auburn University)
2. Ulrich Albrecht (Auburn University)
3. Shayea Aldossari (Florida State University)
4. Ayman Badawi (American University of Sharjah, United Arab Emirates)
5. Irfan Bagci (University of North Georgia)
6. Aram Bingham (Tulane University)
7. Gary Birkenmeier (University of Louisiana-Lafayette)
8. Guy Roger Biyogmam (Georgia College & State University)
9. Meaza Bogale (Auburn University)
10. Lorraine Bryan ( Gwinnett County Public Schools)
11. Mahir Bilen Can (Tulane University)
12. G. Alan Cannon (Southeastern Louisiana University)
13. Henry Chimal Dzul (Ohio University)
14. Jorg Feldvoss (University of South Alabama)
15. Davide Fusi (University of South Carolina Beaufort)
16. Luyining (Elaine) Gan (Auburn University)
17. Mark Greer (University of North Alabama)
18. Daniel Herden (Baylor University)
19. Olivier Heubo-Kwegna (Saginaw Valley State University)
20. Hayden Houser (Tulane University)
21. Huaajun Huang (Auburn University)
22. Andy Jenkins (University of Georgia)
23. Shitu Fawaz Jimoh (New Mexico State University)
24. Garrett Johnson (North Carolina Central University)
25. Martin Juras (Savannah College of Art and Design)
26. Lee Klingler (Florida Atlantic University)
27. Enoch Lee (Auburn University Montgomery)
28. Justin Lynd (University of Louisiana at Lafayette)

29. Kent Neuerburg (Southeastern Louisiana University)
30. Jean B Nganou (University of Houston-Downtown)
31. Bach Nguyen (Temple University)
32. Daniela Nikolova (Florida Atlantic University)
33. Lokendra Paudel (University of South Carolina, Salkehatchie)
34. Cornelius Pillen (University of South Alabama)
35. Lee Raney (University of North Alabama)
36. Jack Rebrovich (Baylor University, USA)
37. Prasad Senesi (The Catholic University of America)
38. Yiyang She (Tulane University)
39. Tin-Yau Tam (University of Nevada, Reno)
40. Simplicie Tchamna (Georgia College & State University)
41. Aaron Kolby Thrasher (University of North Alabama)
42. Jose A. Velez-Marulanda (Valdosta University)
43. Corey Wolfe (Tulane University)
44. Eunkyung You (Abraham Baldwin Agricultural College)

## SCHEDULE OF PRESENTATIONS

Friday, March 20 2020

Afternoon

Arts and Sciences Building **Room 272**

- 12:30 pm - 1:10 pm Registration
- 1:15 pm - 1:25 pm Opening remarks
- 1:30 pm - 1:55 pm Sima Ahsani: *Extension of inequalities related to the matrix geometric mean to lie groups.*
- 2:00 pm - 2:25 pm Irfan Bagci: *On Whittaker modules for Lie superalgebra.*
- 2:30 pm - 2:55 pm Guy R. Biyogmam: *Structuring Leibniz Algebras via Lie-derivations.*

### Coffee Break

- 3:30 pm - 3:55 pm Jorg Feldvoss: *Semi-Simple Leibniz Algebras and their Derivations.*
- 4:00 pm - 4:25 pm Luyining (Elaine) Gan: *Curvature of matrix and reductive Lie groups.*
- 4:30 pm - 4:55 pm Prasad Senesi: *Highest-weight representations and global Weyl modules: from classical Lie algebras to Yangians*
- 6:00 pm - **Dinner:** Buffet at the Maxwell Student Union (address: 100 N Clarke St, Milledgeville, GA 31061).

Saturday, March 21 2020

Morning

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**Concurrent session** Arts and Sciences Building **Room 272**

8:00 am - 8:25 am Cornelius Pillen: *Donkin's tilting module conjecture and group type  $G_2$ .*

8:30 am - 8:55 am Huajun Huang: *Upper triangular similarity and Belitskii's canonical form.*

9:00 am - 9:25 am Hayden Houser: *On the Borel submonoid of a symplectic monoid.*

**Coffee Break**

10:00 am - 10:25 am Aram Bingham: *Bruhat posets of Hermitian-type.*

10:30 am - 10:55 am Justin Lynd: *Automorphisms which centralize a Sylow  $p$ -subgroup.*

11:00 am - 11:25 am Mahir Bilen Can: *Spherical Schubert varieties.*

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**Concurrent session** Arts and Sciences Building **Room 275**

8:00 am - 8:25 am Ulrich Albrecht: *Endomorphism rings of modules.*

8:30 am - 8:55 am Gary Birkenmeier: *Quasi-s.Baer Modules.*

9:00 am - 9:25 am Martin Juras: *A note on commuting probabilities in groups and rings.*

**Coffee Break**

10:00 am - 10:25 am Olivier Heubo-Kwegna: *Projective star operations on polynomial rings.*

10:30 am - 10:55 am Lee Klingler: *Semiclean group rings.*

11:00 am - 11:25 am Enoch lee: *Generalized martindale right ring of quotients.*

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11:30 am - 11:40 am **Conference Group Picture**

11:40 am - 1:20 pm **Lunch Break**

**Saturday, March 21 2020**

Afternoon

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**Concurrent session** Arts and Sciences Building **Room 272**

1:30 pm - 1:55 pm Garrett Johnson: *Quantized nilradicals of parabolic subalgebras of  $sl(n)$  and algebras of coinvariants.*

2:00 pm - 2:25 pm Bach Nguyen: *On the adjoint representation of Hopf algebra and more.*

2:30 pm - 2:55 pm Aaron Kolby Thrasher: *Real eigenvalues of octonionic matrices*

**Coffee Break**

3:15 pm - 3:40 pm *No talk scheduled in this room. Talks continue in Room 275*

3:45 pm - 4:10 pm *No talk schedule in this room. Talks continue in Room 275*

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**Concurrent session** Arts and Sciences Building **Room 275**

1:30 pm - 1:55 pm Ayman Badawi: *On the generalizations of valuation domains.*

2:00 pm - 2:25 pm Paudel Lokendra: *The group of divisibility of a finite intersection of valuation overrings of affine domains.*

2:30 pm - 2:55 pm Simplice Tchamna: *A study of the star-hash property for ring extensions.*

**Coffee Break**

3:15 pm - 3:40 pm Kent Neuerburg: *Centers of centralizer Nearings determined by inner automorphisms of symmetric groups.*

3:45 pm - 4:10 pm G. Alan Cannon : *The Structure of Some Nearings of Functions*

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4:30 pm - 5:30 pm Tour of the ***Old Governor's Mansion.***  
Now a Museum and a property of Georgia College, the building was the Governor's Mansion when Milledgeville was the capital of Georgia (1839 - 1868).

6:30 pm - **Dinner:** Buffet at the Maxwell Student Union (address: 100 N Clarke St, Milledgeville, GA 31061).

**Sunday, March 22 2020**

Morning

Arts and Sciences Building **Room 272**

8:00 am - 8:25 am Jean B. Nganou: *On  $z$ -ideals of MV-algebras of continuous functions.*

8:30 am - 8:55 am Tin-Yau Tam: *Weak log-majoration of unital trace-preserving completely positive maps.*

9:00 am - 9:25 am Jose A. Velez-Marulanda: *Derived tame cluster-tilted algebras of Dynkin type E.*

**Coffee Break**

10:00 am - 10:25 am Daniel Herden: *Reduced finitary incidence algebras and their automorphisms.*

10:30 am - 10:55 am Jack Rebrovich: *The group of algebra automorphisms of the group of units of a finitary incidence algebra.*

11:00 am - 11:25 am Henry Chimal Dzul: *Minimal reflexive nonsemicommutative rings.*

11:30 am - Organization meeting for **SRAC 2021**



## ABSTRACTS

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*Room 272: March 20*

*1:30 pm - 1:55 pm*

### **Extension of inequalities related to the matrix geometric mean to Lie groups**

Sima Ahsani  
Auburn University

After introducing the matrix geometric mean which has many properties of the geometric mean of two positive numbers, I will discuss log-majorization inequalities involving the matrix geometric mean and their extension to the context of Lie groups using Kostant preorder, defined by Bertram Kostant(1973), on noncompact semisimple Lie groups.

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*Room 275: March 21*

*8:00 am - 8:25 am*

### **Endomorphism Rings of Modules**

Ulrich Albrecht  
Auburn University

This talk will give a brief outline how the endomorphism ring of a right  $R$ -module  $M$  over a ring  $R$  can be used to describe homological properties of  $M$ . A historical overview is given, and a series of open problem stated.

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*Room 275: March 21*

*1:30 pm - 1:55 pm*

### **On generalizations of valuation domains**

Ayman Badawi  
The American University of Sharjah

Let  $R$  be an integral domain with quotient field  $K$ . In this talk, we survey many generalizations of valuation domains. For example: Pseudo-valuation domains as in [Pacific J. Math. 75(1978), 137–147.]; Almost-valuation domains as in [J. Algebra 142(1991), 285–309.]; Pseudo-almost-valuation domains as in [Comm. Algebra 35(2007), 1167-1181.]; Almost-pseudo-valuation domain as in [Comm. Algebra 30(2002), 1591–1606. ]. Let  $n \geq 1$ . Then Anderson and Badawi in [ $n$ -Pseudo-valuation domains (in preparation)] recently introduced  $n$ -Pseudo-valuation domains,  $n$ -valuation domains, and pseudo- $n$ -valuation domains.

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*Room 272: March 20*

*2:00 pm - 2:55 pm*

**On Whittaker modules for Lie superalgebras**

Irfan Bagci

University of North Georgia

B. Kostant defined Whittaker modules for finite dimensional complex semisimple Lie algebras. Since then, a number of others have further developed the idea of Whittaker modules for Lie algebras. Whittaker modules for Lie superalgebras were defined by Bagci, Christodouloupoulou, and Weisner. Unlike the Lie algebra setting, simple finite dimensional modules for a finite dimensional nilpotent Lie superalgebra are not always one dimensional. This creates an additional challenge for producing Lie algebra results in the Lie superalgebra setting. For this reason we restrict to basic classical Lie superalgebras of type I. Recently, we have given a description of simple Whittaker modules for basic classical Lie superalgebras of type I. In this talk we will discuss the simple modules and a description of these modules for type I simple Lie superalgebras.

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*Room 272: March 21*

*10:00 am - 10:25 am*

**Bruhat posets of Hermitian-type symmetric spaces**

Aram Bingham

Tulane University

Let  $G$  be a complex connected reductive algebraic group, let  $B$  be a Borel subgroup of  $G$ , and let  $X$  be a normal irreducible  $G$ -variety. The complexity of the action of  $G$  on  $X$  is the minimal codimension of  $B$ -orbits in  $X$ . In this talk, we will discuss the question of determining the complexity zero actions of maximal reductive subgroups of  $G$  on the Schubert varieties in  $G/B$ .

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*Room 275: March 21*

*8:30 am - 8:55 am*

**Quasi-s.Baer Modules**

Gary Birkenmeier

In 1955, Kaplansky defined a ring  $R$  to be a "Baer ring" if the right annihilator of a nonempty subset of  $R$  is generated (as a right ideal) by an idempotent. Since then there have been numerous papers written on Baer rings and the concept has been generalized in various ways and extended to modules. We say a unital right  $R$ -module  $M$  is "quasi-s.Baer" if for each submodule  $X$  of  $M$  there exists an idempotent  $e$  of  $R$  such that the right annihilator of  $X$  in  $R$  is generated (as a right ideal) by  $e$ . In this talk, I will discuss various properties and examples of quasi-s.Baer modules..

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*Room 272: March 20*  
*2:30 pm - 2:55 pm*

**Structuring Leibniz Algebras via Lie-derivations**

Guy Roger Biyogmam  
Georgia College & State University

Lie-derivations are derivations on Leibniz algebras relative to the Liezation functor  $(\ )_{Lie} : \mathbf{Leib} \rightarrow \mathbf{Lie}$ , which assigns to a Leibniz algebra the Lie algebra  $Lie := \{ \overline{[x,x]} : x \in \}$ , where  $\mathbf{Leib}$  denotes the category of Leibniz algebras and  $\mathbf{Lie}$  denotes the category of Lie algebras. This new concept, among others in this framework, originated from considering the relative notions of central extension in a semi-abelian category with respect to a Birkhoff subcategory, in the particular case where the semi-abelian category is Leibniz and the Birkhoff subcategory is  $\mathbf{Lie}$ . A classical problem concerning the algebra of derivations consists to determine necessary and sufficient conditions under which subalgebras of the algebra of derivations coincide. With this problem in mind, this talk will discuss various concepts of Lie-derivations on Leibniz algebras, including Lie-central derivations,  $ID_*$ -derivations, almost Inner Lie-derivations.

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*Room 272: March 21*  
*11:00 am - 11:25 am*

**Spherical Schubert Varieties**

Mahir Bilen Can  
Tulane University

Let  $G$  be a complex connected reductive algebraic group, let  $B$  be a Borel subgroup of  $G$ , and let  $X$  be a normal irreducible  $G$ -variety. The complexity of the action of  $G$  on  $X$  is the minimal codimension of  $B$ -orbits in  $X$ . In this talk, we will discuss the question of determining the complexity zero actions of maximal reductive subgroups of  $G$  on the Schubert varieties in  $G/B$ .

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*Room 275: March 21*  
*3:45 pm - 4:10 pm*

**The Structure of Some Nearrings of Functions**

G. Alan Cannon  
Southeastern Louisiana University

Let  $(G, +)$  be a finite group, written additively but not necessarily abelian. The set of all functions mapping  $G$  to  $G$ ,  $M(G) = \{f : G \rightarrow G\}$ , forms a right nearring under addition and composition. We consider various subnearrings of  $M(G)$  and a generalization of  $M(G)$  and investigate the internal structure of these nearrings of functions.

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*Room 272: March 22*  
*11:00 am - 11:25 am*

**Minimal reflexive nonsemicommutative rings**

Henry Chimal Dzul  
Ohio University  
Joint work with Steve Szabo

In the classroom as well as for research purposes it is instructive to be aware of examples and counterexamples of mathematical structures that satisfy certain properties. Recently, in a paper on some minimal rings related to 2-primal rings, examples of finite rings of minimum order were given to show that the ring class inclusions between various types of rings (such as symmetric, reversible, duo and PS I) are strict. One type of ring that was left out of that report is an abelian reflexive non-semicommutative ring. In this talk we will show that a ring satisfying those properties has order at least 256; examples of such rings will be also presented.

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*Room 272: March 20*  
*3:30 pm - 3:55 pm*

**Semi-Simple Leibniz Algebras and their Derivations**

Jorg Feldvoss  
University of South Alabama

Leibniz algebras were introduced by Bloh and Loday as non-commutative analogues of Lie algebras. Many results for Lie algebras have been proven to hold for Leibniz algebras but there are also several results that are not true in this more general context.

In the talk I will describe the structure of finite-dimensional semi-simple Leibniz algebras over a field of characteristic zero. They are hemi-semidirect products of a semi-simple Lie algebra  $\mathfrak{g}$  and a certain completely reducible  $\mathfrak{g}$ -module. Then I will apply this to derive some results on the derivations of such Leibniz algebras.

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*Room 272: March 20*  
*4:00 pm - 4:25 pm*

**Curvature of matrix and reductive Lie groups**

Luyining (Elaine) Gan\*, Auburn University  
Tin-Yau Tam, University of Nevada, Reno  
Ming Liao, Auburn University

The curvature provides important information about the geometric structure of a Riemannian manifold. For example, it is related to the rate at which two geodesics emitting from the same point move away from each other: the lower the curvature is, the faster they move apart. Many important geometric and topological properties are implied by suitable curvature conditions. In this talk, we give a simple and direct formula for sectional curvature on the general linear group equipped with the left invariant Riemannian metric induced by the Frobenius norm, which is also valid for many other matrix groups. Similar formula is given for a reductive Lie group. We also discuss the relation between commuting matrices and zero sectional curvature.

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*Room 275: March 21*  
*10:00 am - 10:25 am*

### **Projective Star Operations on Polynomial Rings**

Olivier Heubo-Kwegna  
Saginaw Valley State University

We consider the polynomial ring  $S := K[X_0, \dots, X_n]$  over a field  $K$  and the rings  $R_i := K[\frac{X_0}{X_i}, \dots, \frac{X_n}{X_i}]$  for  $0 \leq i \leq n$ . We introduce the notion of a projective star operation on  $S$  and relate it to the classical star operations on the  $R_i$ 's. We show that the projective Kronecker function ring  $\mathbf{PKr}(S, \star)$  of  $S$  is the intersection of the Kronecker function rings  $\mathbf{Kr}(R_i, \star_i)$ ,  $0 \leq i \leq n$ , where the  $\star_i$ 's are pairwise compatible e.a.b. star operations on the  $R_i$ 's and  $\star$  is a projective star operation on  $S$  built from the  $\star_i$ 's.

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*Room 272: March 22*  
*10:00 am - 10:25 am*

### **Reduced Finitary Incidence Algebras and Their Automorphisms**

Daniel Herden  
Baylor University

Let  $I(P)$  denote the incidence algebra of some locally finite poset  $(P, \leq)$  over some field  $F$  and  $\sim$  some equivalence relation on the set of generators of  $I(P)$ . Then  $I(P, \sim)$  is the subset of  $I(P)$  of all the elements that are constant on the equivalence classes of  $\sim$ . If  $\sim$  satisfies certain conditions, then  $I(P, \sim)$  is a subalgebra of  $I(P)$  and is called a reduced incidence algebra. We extend this notion to finitary incidence algebras  $FI(P)$  for any poset  $(P, \leq)$ . We investigate reduced finitary incidence algebras  $FI(P, \sim)$  and determine their automorphisms in some special cases.

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*Room 272: March 21*  
*9:00 am - 9:25 am*

### **On the Borel Submonoid of a Symplectic Monoid**

Hayden Houser  
Tulane University

In this talk, we consider the combinatorial properties of the complex symplectic monoid  $MSp_n$ . We provide a concrete description of the Bruhat-Chevalley-Renner order on  $MSp_n$  by showing that this partial order is completely determined by the Bruhat-Chevalley-Renner order on the algebraic monoid of  $n \times n$  matrices  $M_n$ . We then develop a relationship between the Borel submonoid of  $MSp_n$  and a new kind of type B set partitions. Finally, we introduce a method of "folding" matrices and use this technique to count the elements of the Borel submonoid

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Room 272: March 21  
8:30 am - 8:55 am

**Upper triangular similarity and Belitskii's canonical form**

Huajun Huang  
Auburn University

This talk gives recent progress on the upper triangular similarity orbit of nilpotent triangular matrices. Let  $B_n$  (resp.  $U_n, N_n$ ) be the set of  $n \times n$  nonsingular (resp. unit, nilpotent) upper triangular matrices. The Belitskii's canonical form of  $A \in N_n$  under  $B_n$ -similarity is in  $QU_n$  where  $Q$  is the subpermutation such that  $A \in B_nQB_n$ . Using graph representations and  $U_n$ -similarity actions stabilizing  $QU_n$ , we obtain new properties of the Belitskii's canonical forms and present an efficient algorithm to find the Belitskii's canonical forms in  $N_n$ . As consequences, we construct new Belitskii's canonical forms in all  $N_n$ 's, list all Belitskii's canonical forms for  $n = 7, 8$ , and show examples of 3-nilpotent Belitskii's canonical forms in  $N_n$  with arbitrary numbers of parameters up to  $O(n^2)$ .

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Room 272: March 21  
1:30 pm - 1: 55 pm

**Quantized nilradicals of parabolic subalgebras of  $\mathfrak{sl}(n)$  and algebras of coinvariants**

Garrett Johnson  
North Carolina Central University

Let  $P_J$  be the standard parabolic subgroup of  $SL_n$  obtained by deleting a subset  $J$  of negative simple roots, and let  $P_J = L_JU_J$  be the standard Levi decomposition. Multiplication  $L_J \times P_J \rightarrow P_J$  induces a coaction  $\mathcal{O}(P_J) \rightarrow \mathcal{O}(L_J) \otimes \mathcal{O}(P_J)$ . We turn our attention to the quantum analogue  $\theta : \mathcal{O}_q(P_J) \rightarrow \mathcal{O}_q(L_J) \otimes \mathcal{O}_q(P_J)$  of this coaction and the corresponding subalgebra  $\mathcal{O}_q(P_J)^{\text{co}\theta} \subseteq \mathcal{O}_q(P_J)$  of coinvariants. Due to a result of Jaramillo, the smash product algebra  $\mathcal{O}_q(L_J) \# \mathcal{O}_q(P_J)^{\text{co}\theta}$  is isomorphic to  $\mathcal{O}_q(P_J)$ . In view of this,  $\mathcal{O}_q(P_J)^{\text{co}\theta}$  – while it is not a Hopf algebra – can be viewed as a quantum analogue of the coordinate ring  $\mathcal{O}(U_J)$ . When  $q \in \mathbb{K}$  is nonzero and not a root of unity,  $\mathcal{O}_q(P_J)^{\text{co}\theta}$  is isomorphic to the quantized nilradical  $\mathcal{U}_q(\mathfrak{n}_J)$ , where  $\mathfrak{n}_J = \text{Lie}(U_J)$ .

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Room 275: March 21  
9:00 am - 9:25 am

**A note on commuting probabilities in groups and rings**

Martin Juras  
Savannah College of Art and Design

We prove that the commuting spectrum for finite rings is a subset of the commuting spectrum for finite nilpotent groups of class at most 2, thereby resolving a conjecture of Buckley and MacHale.

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*Room 275: March 21*  
*10:30 am - 10:55 am*

**Semiclean group rings**  
Lee Klingler  
Florida Atlantic University

We call the commutative ring  $R$  a *clean ring* if every element of  $R$  can be written as the sum of a unit and an idempotent. The notion of a clean ring was defined by Nicholson [1977] in a study of exchange rings and lifting idempotents. Ye [2003] introduced the notion of semiclean rings:  $R$  is called a *semiclean ring* if every element of  $R$  can be written as the sum of a unit and a periodic element, where  $r \in R$  is called *periodic* if there are natural numbers  $k < n$  such that  $r^k = r^n$ . In joint work with Alan Loper, Warren McGovern, and Matthew Toeniskoetter, we explore conditions on the commutative ring  $R$  and the abelian group  $G$  that make the group ring  $R[G]$  semiclean.

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*Room 275: March 21*  
*11:00 am - 11:25 am*

**Generalized Martindale right ring of quotients**  
Enoch Lee  
Auburn University Montgomery

Martindale ring of quotients is a useful tool in the study of prime rings satisfying a generalized polynomial identity. In this talk we discuss briefly a generalization of Martindale ring of quotients and Martindale symmetric ring of quotients from prime rings to any rings.

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*Room 272: March 21*  
*10:30 am - 10:55 am*

**Automorphisms which centralize a Sylow  $p$ -subgroup**  
Justin Lynd  
University of Louisiana at Lafayette

Automorphisms which restrict to the identity on a Sylow subgroup have been studied by a number of authors over the years. I will report on recent work Glauberman, Guralnick, and Navarro in which we strengthen a result of Gross on such automorphisms for odd primes  $p$ . Also, I will discuss recent work with Glauberman on extensions of classical results on automorphisms of finite groups to linking systems associated with saturated fusion systems, and a result comparing automorphisms of a group with automorphisms of the centric linking system for the group that gives a reinterpretation of the work of Glauberman around the Schreier conjecture.

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*Room 275: March 21*  
*3:15 pm - 3:40 pm*

**Centers of Centralizer Nearrings Determined by Inner Automorphisms of Symmetric Groups**

Kent Neuerburg  
Southeastern Louisiana University

The question of identifying the elements of the center of a nearring and of determining when the center is a subnearring is an area of continuing research. We consider the center of centralizer nearrings,  $M_I(S_n)$ , determined by the symmetric groups  $S_n$  and the inner automorphisms  $I = Inn(S_n)$ .

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*Room 272: March 22*  
*8:00 am - 8:25 am*

**On  $z$ -ideals of MV-algebras of Continuous functions**

Jean B. Nganou  
University of Houston-Downtown

The connection between ideals of MV-algebras of continuous  $[0, 1]$ -valued functions on a space  $X$  and the  $z$ -filters on  $X$  is investigated. When  $X$  is compact Hausdorff, the stated connection carries prime ideals to prime  $z$ -filters and conversely. We show that the class of MV-algebras for which prime ideals and prime  $z$ -filters are in one-to-one correspondence is that of strongly semisimple MV-algebras.

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*Room 272: March 21*  
*2:00 pm - 2:25 pm*

**On the adjoint representation of Hopf algebra and more**

Bach Nguyen  
Temple University

Representation theory of Hopf algebra plays an important role in many areas of mathematics. In this talk we discuss the adjoint representation of a Hopf algebra  $H$  and its locally finite part. Specifically, we show that the locally finite part is a left coideal subalgebra, for general  $H$ . For the case when  $H$  is "virtually" cocommutative, the locally finite part is a Hopf subalgebra. Additionally, we prove a Hopf algebra version of Dietzmann's Lemma from group theory. This is a joint work with S. Kolb, M. Lorenz, and R. Yammine.



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*Room 275: March 21*  
*2:00 pm - 2:25 pm*

**The Group of Divisibility of a Finite Intersection of Valuation Overrings of Affine Domains**

Lokendra Paudel  
University of South Carolina, Salkehatchie

The group of divisibility of an integral domain is the multiplicative group of nonzero principal fractional ideals of the domain. The goal of this presentation is to describe the group of divisibility of a finite intersection of valuation overrings of the domain  $D = k[x_1, x_2, \dots, x_n]$ , where  $k$  is a field and  $x_1, x_2, \dots, x_n$  are indeterminates for  $k$ . In particular, we focus on the case for  $n \leq 3$ .

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*Room 272: March 21*  
*8:00 am - 8:25 am*

**Donkin's tilting module conjecture and groups of type  $G_2$**

Cornelius Pillen  
University of South Alabama

Tilting modules for reductive algebraic groups over fields with positive characteristic feature prominently in new approaches towards finding character formulas for simple modules. A long-standing conjecture by Donkin says that certain tilting modules are isomorphic to indecomposable injective modules when restricted to the Frobenius kernel of the algebraic group. It was recently shown that the conjecture does not hold for a group of type  $G_2$  and characteristic 2. In this talk we verify Donkin's conjecture for  $G_2$  and characteristic 3.

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*Room 272: March 22*  
*10:30 am - 10:55 am*

**The Group of Algebra Automorphisms of the Group of Units of a Finitary Incidence Algebra**

Jack Rebrovich  
Baylor University

The group of algebra automorphisms of a finitary incidence algebra was completely classified by N. Khripchenko. In this talk, I will take this a step further and, using a special type of normal subgroup, classify the algebra automorphisms of the group of units of the finitary incidence algebra over the integers.

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*Room 272: March 20*

*4:30pm - 4:55 pm*

**Highest-weight representations and global Weyl modules: from classical Lie algebras to Yangians**

Prasad Senesi

The Catholic University of America

Bach Nguyen (Temple University)

Matt Lee (University of Illinois at Chicago)

Highest-weight representations play a prominent role in the representation theory of Lie algebras and quantum groups. Particular examples of highest-weight representations of certain infinite-dimensional Lie algebras called the Weyl modules (for loop and quantum algebras) were introduced by Chari and Pressley in 2000. In this introductory talk, we proceed by example from the classical structure and representation theory of the special linear algebra in dimensions 2 and 3, to that of the corresponding Loop algebras and quantum groups. Along the way, the utility of highest-weight representations, and of the (local and global) Weyl Modules, in all of these settings will be described. We will conclude with a discussion of the Yangian, its relation to the quantum loop algebra, and some recent work concerning its global Weyl modules.

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*Room 272: March 22*

*8:30 am - 8:55 am*

**Weak log-majorization of unital trace-preserving completely positive maps**

Tin-Yau Tam

University of Nevada, Reno

Let  $\Phi : \mathbf{M}_n \rightarrow \mathbf{M}_n$  be a unital trace preserving completely positive map and  $A \in \mathbf{M}_n$  be a positive definite matrix. Weak log-majorization and weak majorization between  $\Phi(A)$  and  $A$  are studied. Determinantal inequalities between  $\Phi(A)$  and  $A$  are obtained as a consequence. By considering special classes of unital trace preserving completely positive map, some known matrix inequalities such as Fischer's inequality are rediscovered. An affirmative answer to a question of Tam and Zhang in 2019 is given.

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*Room 275: March 21*

*2:30 pm - 2:55 pm*

**A study of the star-hash property for ring extensions**

Simlice Tchamna

Georgia College & State University

The concept of star-hash property generalizes the notion  $t\#$ -domain studied by Gabelli, Houston and Lucas in [J. Pure Appl. Alg 194: 281 - 298]. We study ring extensions satisfying the star-hash property. Special attention is given to the case of Prüfer extensions.

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*Room 272: March 21*  
*2:30 pm - 2:55 pm*

**Real eigenvalues of octonionic matrices**

Aaron Kolby Thrasher  
University of North Alabama

The octonionic eigenvalue problem has become of interest due to its applications to particle physics. Here, we present results from an undergraduate research project on the eigenvalues of 2-by-2 octonionic matrices whose entries lie in a complex (or possibly quaternionic) subspace of the octonions. Our methods are motivated by Dray and Manogue's study of real eigenvalues of 2-by-2 (and 3-by-3) octonionic Hermitian matrices.

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*Room 272: March 22*  
*9:00 am - 9:25 am*

**Derived tame cluster-tilted algebras of Dynkin type E**

Jose A. Velez-Marulanda  
Valdosta State University

Drozd-Bekker's fundamental tame-wild dichotomy theorem for derived categories implies that a finite dimensional algebra over a field is either derived tame or derived wild. Using so-called string and band complexes, Bekker and Merklen proved that gentle algebras (as introduced by Assem and Skowronski) are derived tame. In this talk, we define string and band complexes for cluster-tilted algebras of Dynkin type E (as classified up to derived equivalence by Bastian, Holm and Ladkani) and show that they classify completely the indecomposable objects in the corresponding bounded derived category. This implies in particular that this class of algebras are derived tame. This is a joint-work with Ibrahim Assem.