

UNT UTA Algebra Symposium

University of North Texas
November 9, 2013

Tentative Schedule of Talks

Saturday, November 9, 2013		
8:45 am	Coffee & Tea	
9:00 - 9:20am	Kelly Aman (UTA)	A Quick Introduction to Finite Semifields
9:40 - 10:00am	Ojas Dave (UNT)	On Finding the Irreducible Characters of a Hecke Algebra
10:20-10:40am	Tom Ferguson (UTA)	Weight Representations of Lie Superalgebras
11:00-11:20am	Angela Berardinelli (UNT)	Hyperplane arrangements and invariants of finite complex reflection groups
11:40-12:00pm	Philip Punte (UNT)	Infinite Complex Reflection Groups and Generalizations of the Braid Group
12:00 - 2:00pm	Break for Lunch	
2:00 - 2:20pm	Richard Chandler (UTA)	Point Modules
2:40 - 3:00pm	Ignat Soroko (OU)	Lubotzky's Linearity Criterion
3:20 - 3:40pm	Scott Lacy (UTA)	Applications of Non-associative Algebraic Systems in Cryptography
4:00 - 4:20pm	Denise Rangel (UTA)	A Search for Almost Split Sequences
4:40 - 5:00pm		

Coffee & Tea is in GAB 461

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Abstracts

A Quick Introduction to Finite Semifields

~Kelly Aman

Abstract: Finite semifields can be thought of as finite division rings with identity in which the multiplication is not necessarily associative. The term semifield is used because of how closely these rings resemble finite fields, and this talk will compare some of the major algebraic properties of finite fields vs finite semifields. Time permitting, methods of constructing semifields from finite fields will be presented.

On Finding the Irreducible Characters of a Hecke Algebra

~Ojas Dave

Irreducible characters encode information about a myriad of objects. In this talk, I will lay the foundations of finding the irreducible characters for a certain Hecke Algebra. I will define this Hecke algebra, give a basis for it and describe the tools needed to compute its irreducible characters.

Weight Representations of Lie Superalgebras

~Tom Ferguson

A method for decomposing orthosymplectic Lie superalgebras into weight modules is described. Based on a Weyl representation over the ring of Laurent polynomials, the conditions for existence of a direct sum decomposition are explored.

Hyperplane arrangements and invariants of finite complex reflection groups

~Angela Berardinelli

Consider a finite, unitary reflection group G acting on a complex vector space V and an element X in the lattice of the associated hyperplane arrangement. Let N be the setwise stabilizer of X in G , Z the pointwise stabilizer, and $C=N/Z$. Restriction defines a homomorphism from the algebra of G -invariant polynomial functions on V to the algebra of C -invariant polynomials on X . A result of Douglass and Röhrle gives a combinatorial characterization of when this restriction mapping is surjective in terms of the exponents of G and C , if G is a Coxeter group. In this talk, we will discuss current work toward extending this result to arbitrary finite reflection groups.

Infinite Complex Reflection Groups and Generalizations of the Braid Group

~Philip Puente

Abstract: Infinite reflection groups arise naturally as simple generalizations of finite reflection groups. This natural connection causes many of the same questions to be answered for the infinite reflection groups that arise from the study of their finite counterparts. Braid groups, which were first introduced by Artin for the symmetric groups, can be constructed for any reflection group. In this talk we will discuss a result concerning braid groups for finite groups and a conjecture for infinite reflection groups.

Point Modules

~Richard Chandler

In the 1980's, many noncommutative algebraists sought to generalize the connection between commutative algebra and algebraic geometry into a noncommutative setting. In 1990, Artin, Tate and Van den Bergh made a great step forward in this endeavor, introducing the concept of a point module in their paper, *Some Algebras Associated to Automorphisms of Elliptic Curves*. In this talk, we will discuss the definition and construction of point modules, as well as examine some algebras and their associated point modules.

Lubotzky's linearity criterion

~Ignat Soroko

Alexander Lubotzky discovered an intrinsic criterion for linearity of a finitely generated group over a field of characteristic zero. It is related to the existence of a certain system of finite index subgroups which guarantee that the group in question virtually embeds into an analytic pro- p group. I will explain the notions involved in the main result and illustrate some applications to the question of linearity of split extensions of free groups.

Applications of Non-associative Algebraic Systems in Cryptography

~Scott Lacy

A neofield is a set with two binary operations similar to a field, with the addition not necessarily associative and the multiplication not necessarily commutative. This survey of work by J. Denes and A.D. Keedwell will demonstrate several advantages of finite neofields over the traditional use of finite fields in cryptographic systems.

A Search for Almost Split Sequences

~Denise Amanda Rangel

An almost split sequence is a special type of short exact sequence in which the first term is the Auslander-Reiten translate of the last term. We'll investigate two known ways in which one can compute the AR-rotate and thus almost split sequences. We will also show that both methods fail if we are restricted to the category of totally reflexive modules.