Changing dispersion for KdV
Timur Akhunov, Binghamton University

Abstract: Dispersive partial equations describe evolution of waves, whose speed of propagation depends on wave frequency. The uncertainty principle of quantum mechanics is intimately tied to the dispersion in the Schrodinger equation. The Korteweg-de Vries (KdV) equation, derived in 1890s to explain surface waves in a shallow fluid, is among the most studied dispersive PDE. Dispersion has since then found a way to connect with harmonic analysis, number theory and algebraic geometry. In a series of papers (the last in collaboration with David Ambrose and Doug Wright from Drexel) we have independently rediscovered and adapted techniques from thin-film equations to the context of KdV.

Dyadic harmonic analysis and weighted norm inequalities
Roy Cardenas, University at Albany

Abstract: This survey talk will be about the study of inequalities of the form

$$\int_{\mathbb{R}^d} |Tf(x)|^p \, v(x)dx \leq C \int_{\mathbb{R}^d} |f(x)|^p \, u(x)dx.$$

There are plenty of questions to ask here: For instance, for which operators T and which weights u and v can we say that these inequalities hold? How does the constant C depend on these functions? What kinds of techniques go into proving these inequalities?

This talk will focus on situations where T is some operator of harmonic analysis fame (e.g., the maximal operator, the Hilbert transform, the dyadic square operator), and, crucially, when u and v are Muckenhoupt weights. Moreover, we will discuss certain challenges that arise when working with matrix weights instead of scalar weights.

An energy lemma and an application to thin inhomogeneities
Matt Charnley, Rutgers University

Abstract: For elliptic PDEs, the solution (at least in a weak form) can usually be found via the minimization of a certain energy functional. In this talk, we will discuss a result that says that if two energy functionals are close, in an appropriate sense, then their resulting minimizers are also close. We will then talk about an application of this idea to analyzing the solution to conductivity problems with thin inhomogeneities.

On a problem of Falconer and mechanical rigidity
Nikolaos Chatzikonstantinou, University of Rochester

Abstract: For a compact set E of the Euclidean d-space and a connected graph G on $k+1$ vertices with m edges, we define a point configuration to be the set of $(k+1)$-tuples in E

where m of all the possible pairwise distances are specified in accordance with the structure of G. We prove that there exists $s(k) < d$ such that if the Hausdorff dimension of E is greater than $s(k)$, then the m-dimensional Hausdorff measure of the congruence classes, suitably defined, of the said point configurations is positive. This can be viewed as a generalization of the Falconer distance problem on one hand, and of the Furstenberg-Katznelson-Weiss type configuration results on the other. The proof relies on analytic, combinatorial and topological considerations.

Waring's Problem in Finite Rings

Yesim Demiroglu Karabulut, University of Rochester

Abstract: In this talk we apply some classical mathematics to extend results for Waring's problem to the context of general finite rings. Whereas there has been an extensive literature devoted to obtaining Waring type results over $\mathbb{Z}/n\mathbb{Z}$, over finite fields, and over certain kinds of matrix rings, we are not aware of any other such results in the context of general finite rings. We will start by explaining some fundamental Artin-Wedderburn theory and how one can use it together with a variant of Hensel's lemma to deduce sharp results for the Waring's problem over general (not necessarily commutative) finite rings by building on analogous results over finite fields. We will also present some elementary new proofs (using Cayley digraphs and spectral graph theory) for Waring type results over finite fields, and explain how in the process of re-proving these finite field results, we obtain an original result providing an analogue of Sárközy's theorem in the finite field setting (showing that any subset E of a finite field $\mathbb{F}_q$ for which $|E| > \frac{qk}{\sqrt{q-1}}$ must contain at least two distinct elements whose difference is a k^{th} power).

Generally Speaking: A Talk on Universal Algebra

Jonathan Doane, Binghamton University

Abstract: Universal Algebra breaks down algebraic structures like groups and rings to their core, leaving only an underlying set and a collection of operations to be performed on that set. We use this core information to generalize and even unify theories from seemingly different branches of Algebra. Anyone with experience with groups or other algebraic structures should be able to follow this logic-flavored talk, as we work our way from the basics - to the proof of Birkhoff's Theorem on varieties.

Transverse Knots and Grid Homology

Hakan Doga, University at Buffalo

Abstract: Transverse knots are special knots defined in a contact 3-manifold. In this talk,

I will talk about the grid representation of transverse knots, classical invariants of transverse knots and the transverse knot invariant $\hat{\theta}$ in Grid Homology. If the time permits, I will present an example about the power and efficiency of this transverse knot invariant to determine transverse non-simplicity and my future project of refining this invariant.

Traveling fronts and pulses in neural field models

Alan Dyson, Lehigh University

Abstract: In this talk, we investigate existence, uniqueness, and spectral stability of traveling waves arising from a system of integro-differential equations with one spatial dimension and biologically motivated synaptic coupling types. Since tracing studies show that neurons throughout the mammalian cortex form long-ranged excitatory connections, we aim to generalize the notions of pure excitation, lateral inhibition, and lateral excitation by allowing coupling types to spatially oscillate between excitation and inhibition. From a dynamical systems perspective, we discuss the connection between fronts and pulses with fast-slow time scales. Explicit examples are discussed with traveling waves computed numerically and compared to singular homoclinical orbits in phase space plots.

Bounded commutative BCK-algebras do not form a discriminator variety

Matt Evans, Binghamton University

Abstract: In this talk I will explain what it means for an algebra (in the sense of universal algebra) to be a discriminator algebra, and for a variety of algebras to be a discriminator variety. Discriminator varieties are well-studied and have many nice properties. For example, in a discriminator variety, the notions of simple, subdirectly irreducible, and directly indecomposable all coincide. I will show that the variety of bounded commutative BCK-algebras is not a discriminator variety, and discuss why this is unfortunate. All the relevant terms will be defined, and no knowledge of universal algebra will be assumed.

Improvements to Principal Component Projection without Principal Component Analysis

Steve Farnham, Syracuse University

Abstract: In this talk, a basic overview of Principal Component Analysis and recent work in the field of Principal Component Projection will be discussed. There will be an overview of an existing method for finding Principal Component Projection followed by recent improvements to this method and some newly found applications. This talk is aimed towards a graduate level audience or undergraduates familiar with Linear Algebra.

Complex Dynamics on The Projective Spectrum of the Infinite Dihedral Group
Bryan Goldberg, University at Albany

Abstract: Using the self-similarity of the infinite dihedral group, D_∞ we define a mapping $F : \mathbb{C}^3 \to \mathbb{C}^3$ where $F(z) = \big(z_0(z_0^2 - z_1^2 - z_2^2), z_1^2 z_2, z_2(z_0^2 - z_2^2)\big)$. After establishing some background on $F(z)$ we'll use complex dynamics to establish some principles of this complicated mapping. We'll use equivalent projective space and look at $F : \mathbb{P}^2 \to \mathbb{P}^2$ to better evaluate properties important in dynamics. And conclude with discussing some results about the extended indeterminacy set, cyclic points, and components of the Julia set.

Geometric Properties of Upper Level Sets of Lelong Numbers of Currents on $\mathbb{P}^n$
James Heffers, Syracuse University

Abstract: Lelong numbers are a useful tool for complex analysts wanting to look at the mass a current T has at a given point. In this talk we look at the geometric properties of sets of points where a current T has "large" Lelong numbers, and see that the points where our current has large Lelong number can be contained in a small subspace of $\mathbb{P}^n$. The talk will start with introductory definitions and some simple examples to give the audience an intuition for these concepts before building up to the main results.

Bayesian Inference: An Overview of the Theory and its Applications to Data Analysis, with a Case Study in Automobile Reliability
Timothy M. Herger, Western Connecticut State University

Abstract: The theory of Bayesian inference, which is a method of statistical inference in which Bayes' theorem is used to update probabilities as more information becomes available, is one of two major overarching philosophies of modern statistical inference. As a result of recent advances in computer technology, Bayesian inference has become a cornerstone technique for practical applications and is being effectively implemented and executed in the analysis of real-world datasets at the scale of todays modern world of Big Data. These theories have expanded beyond their mathematics into philosophies that spark fiery debate among statisticians concerning how evidence should be treated, as well as how conclusions should be reached from data analysis. These philosophies probe the effectiveness of objectivity versus subjectivity with regard to their roles in data-driven decision making.

The purpose of the talk is threefold. First, the talk will introduce the theory of Bayesian analysis from a mathematical statistics standpoint, discussing the differences between Bayesian and Frequentist Inferential Statistics. Next, the talk will discuss how the theory is used in data analysis, with some limited discussion of recent developments in software that have enabled this centuries-old theory to be used in real world applications. Finally, the talk will conclude with an example using survey data from Consumer Reports Annual Questionnaire to estimate the reliability of automobiles.

New symmetries of stable homotopy groups
Mohammad Kang, Wayne State University

Abstract: This will really be a talk about abstract algebra and some very elementary number theory, but the motivation for the work comes from topology. Work of Bousfield, Ravenel, Morava, Miller, Wilson, and others during the 1970s and 1980s established that the stable homotopy groups of spheres can be decomposed into many periodic families, each of which repeats every $2(p^n - 1)$ dimensions, where p is a prime and n is a nonnegative integer; and furthermore, if one fixes p and n, then there are spectral sequences that one can, in principle, use to calculate the $2(p^n - 1)$-periodic families in the stable homotopy groups of spheres. These spectral sequence calculations are extremely difficult, however, and complete calculations have only been made for $n < 3$.

When $p > n + 1$, these spectral sequence calculations begin with the cohomology of a certain differential graded algebra defined by Ravenel. In this talk, we give a very explicit description of this (surprisingly simple!) differential graded algebra, and we explore the problem of finding symmetries (i.e., automorphisms) of this differential graded algebra for large n. We show how we reduce the problem of finding such symmetries to a very explicit and elementary problem in number theory, and we demonstrate some new symmetries – which give rise to new operations on the $2(p^n-1)$-periodic stable homotopy groups of certain CW-complexes called Smith-Toda complexes – which our elementary, explicit approach produces. (The focus of the talk will be on the very approachable algebra and elementary number theory which we used to get our new results; the ideas from homotopy theory are there to motivate our work, but our talk should be understandable to an audience which does not know any homotopy theory!)

Euler-Bernoulli Beam Model with Non-Dissipative Boundary Control
Laszlo Kindrat, University of New Hampshire

Abstract: The talk will begin by introducing the Euler-Bernoulli model for long slender beams, and the associated PDE. Then a control method is introduced that generates non-traditional boundary conditions depending on two control parameters that relates the two-dimensional input vector (the shear and the moment at the right end) and the observation vector (the time derivatives of displacement and the slope at the right end). The operator theoretical formulation of the systems evolution equation is described, and the dynamics generator (a non-selfadjoint differential operator on a Hilbert space) is presented. Analytical results including asymptotic approximations will be given on the spectrum of the operator, which corresponds to the vibrational modes of the beam. A high-accuracy numerical scheme is quickly outlined and results corroborating the analytical findings are presented.

Random processes of the form $X_{n+1} = AX_n + B_n (\text{mod } p)$
Kseniya Klyachko, University at Albany

Abstract: While examining the random process of the form $X_{n+1} = AX_n + B_n (\mathrm{mod} p)$ where $A = \begin{bmatrix} 2 & 1 \\ 1 & 1 \end{bmatrix}$ is a fixed matrix, $B_0, B_1, B_2, \ldots$ are independent and identically distributed on $\begin{bmatrix} 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ 0 \end{bmatrix}$, and $X_0 = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$, we come upon the Fibonacci sequence. Keeping in mind the goal of bounding the rate of convergence of this process to the uniform distribution, we discuss the Fourier Transform and its role in this setting. We also introduce an expansion we call the Fibonary expansion useful in analyzing the Fourier Transform.

Connecting The Extended Yard-Sale Model of Asset Exchange with General Equilibrium Theory*

Jeremy Marcq, Tufts University

Abstract: This presentation aims to show how using new technics borrowed from the fields of mathematics and physics provide fruitful results in micro- and macroeconomics by describing how pairwise transactions act as micro-foundations to generate wealth distributions, hence being able to, not only bridge the gap between the two worlds, but also provide a solid theoretical basis to observed data.

In microeconomics theory, agents are rational and make no mistake. This assumption widely accepted is cause for concerned in real world situations as it is very clear that optimal situations for everybody are unlikely if at all possible.

I will show that not only this assumption is incompatible with data, but also that by playing with only one parameter of the Yard-Sale Model, numerical solutions provide amazing fits to the data and can also be very easily connected to neoclassical economics, hence justifying the relaxation of rationality in favor of a more realistic model.

Finally, implications to the fields of philosophy, public finance and political sciences can be discussed.

Torsion of Rational Elliptic Curves over (Degree 9) Number Fields

Caleb McWhorter, Syracuse University

Abstract: The Mordell-Weil Theorem gives that any elliptic curve E/K can be written $\mathbb{Z}^r \oplus E(K)_{\text{tors}}$, where r is the rank and $E(K)_{\text{tors}}$ are the torsion points of E. The possibilities for r and $E(K)_{\text{tors}}$ are still mysterious today. Mazur classified $E(\mathbb{Q})_{\text{tors}}$ in 1977. Since then, some progress has been made by Clark, Kenku, Lozano-Robledo, Momose, Najman, Sutherland, et al.. This talk will discuss the recent progress in $E(K)_{\text{tors}}$ classifications and progress in the speaker's work in classifying $E(K)_{\text{tors}}$ when K is a degree 9 number field.

Why is algebraic K-theory hard?

David Mehrle, Cornell University

Abstract: Algebraic K-theory is an invariant of rings (not unlike homology of a space); to a group R, algebraic K-theory assigns a group $K_n(R)$ for each nonnegative integer n. These K-groups are interesting for their connections to number theory, algebraic geometry, and geometric and algebraic topology, but they are also notoriously difficult to compute. Their ubiquity is also their undoing: K-theory is in some sense a universal invariant.

In this talk, I will explain the construction of algebraic K-theory and explain why this makes computations difficult. I will also describe techniques that are used to nevertheless extract information about K-theory.

Arakelov theory and ghost spaces

Patrick Milano, Binghamton University

Abstract: Arakelov theory is a way of studying number theory from a geometric point of view. In particular, it allows us to complete arithmetic curves by adding formal points "at infinity." In the case of Spec($\mathbb{Z}$), for example, we add the Archimedean absolute value to the set of prime ideals of $\mathbb{Z}$. These extra points yield an Arakelov divisor theory similar to divisor theory on projective algebraic curves. A ghost space is a new kind of object introduced by Borisov to describe the cohomology of an Arakelov divisor. After introducing the basics of Arakelov theory, I will define ghost spaces and survey their applications to Arakelov theory.

Categoricity of cats

Mostafa Mirabi, Wesleyan University

Abstract: An $\mathcal{L}$-theory T is called λ-categorical if T has a model of cardinality λ and any two models of T of cardinality λ are isomorphic. In 1954 Jerzy Los conjectured that if a firstorder complete theory T in a countable language $\mathcal{L}$ is categorical in **one** cardinal $\lambda \geq \aleph_1$, then T is categorical in **every** cardinal $\lambda \geq \aleph_1$. Morley proved Loss conjecture. This conjecture was open for uncountable theories until 1974 where Saharon Shelah proved it for theories with arbitrary size, known as Shelahs categoricity theorem. Shelahs categoricity is still open for Abstract Elementary Classes (AEC). In this talk we will introduce the notion of compact abstract theory (CAT) and discuss about the categoricity of uncountable CATs which is still open

Stochastic Proximal Algorithms for AUC Maximization

Michael Natole, Jr., University at Albany

Abstract: Stochastic optimization algorithms such as stochastic gradient descent (SGD) update the model sequentially with cheap per-iteration costs, making them amenable for large-scale data analysis. Most of the existing studies focus on the classification accuracy. However, these can not be directly applied to the important problems of maximizing the Area under the ROC curve (AUC) in imbalanced classification and bipartite ranking. In

this talk, we develop a novel stochastic proximal algorithm for AUC maximization which is referred to as SPAM. Compared with the previous literature, our algorithm SPAM applies to a non-smooth penalty function, and achieves a convergence rate of $\mathcal{O}(\frac{\log t}{t})$ for strongly convex functions while both space and per-iteration costs are of one datum.

Avoiding oligarchy: a recipe for efficient redistribution policy

Sam Polk, Tufts University

Abstract: Earlier this year, Oxfam published a statistical finding that showed that while billionaires were created at a record rate in 2017, the lowest 50 percent of the world's population did not see any significant change in wealth. This statistic and ones like it are jarring and bring with them questions about the success of modern redistribution policy. The purpose of wealth redistribution is to provide a fairer playing field for all economic agents, but the rising wealth condensation that has been detailed by government agencies such as the Federal Reserve contradicts the notion that current policy is effective. In this lecture, I will present the econophyisical approach of measuring wealth inequality by means of distributional theory and show the necessary conditions of a redistribution scheme that will end or at the very least reduce the wealth condensation that we are seeing in all developed countries.

The Curve Shortening Flow in the Plane

Fabian Rupp, Syracuse University

Abstract: The Curve Shortening Flow (CSF) is a very simple example of a geometric evolution equation. In this talk, we will introduce the CSF as the gradient flow of the arclength energy and examine characteristic long-time behavior of solutions. If the initial curve is embedded, a famous theorem due to Gage, Hamilton and Grayson shows that the solution to CSF has to shrink to a round point in finite time. We will look at some visualizations to understand the significance of this result and, if time permits, we will also see that the flow may be extended through singularities if the initial data is non-embedded.

Category theory in action

Maru Sarazola, Cornell University

Abstract: Category theory has many widely recognized uses: it is a way to abstract various mathematical disciplines, to show the connections and interplay between them, and to prove or display existing theorems in a more elegant and succinct manner. But it does so much more than that! The goal of this talk will be to show a concrete problem where category theory truly brings something new to the table. No knowledge of category theory is assumed, and any degree of skepticism is welcome.

References: [Fre66] P. Freyd. Algebra valued functors in general and tensor products in particular. XIV, 1966.

Density Functional Theory study of Tunneling Magnetoresistance

Papa Seck and Dereje Seifu, Morgan State University

Abstract: In this work density functional theory (DFT) was used to calculate current density in tunneling magneto resistance (TMR) structure. DFT is an effective technique to study surfaces and interfaces in multilayered thin films by directly solving the many-body Schrodinger equation using Hohenberg-Kohn theorem and Kohn-Sham formulation in local density approximation (LDA) for the exchange and correlation energy. TMR is a magneto resistive effect that occurs in magnetic tunnel junctions (MTJ) devices, with an architecture consisting of two ferromagnetic metals separated by a thin layer of insulator. Electrons tunnel from the lower electrode a ferromagnetic metal to the top through the nano-metric insulating layer when subjected to an external magnetic field.

Here we will present calculations for Fe/Insulator/Fe with potential applications for MRAM in a quantum computer, a new type of non-volatile memory, thermal assisted switching (TAS), and spin torque transfer (STT) used in the wind power industry. Recent experimental comparative study of thin film and nanowires of Fe/Insulator/Fe show an enhanced magnetic properties in the nanowires. In this work we will show that nanowires and nano-columns have higher current than the films [1, 2]. A simulation of tunneling magneto resistance in Fe/Insulator/Fe function was built using ATK QuantumWise 2017 software [3]. The left and the right electrodes consist of fixed one or two Fe layers. The electrodes in the simulation are denoted as lattices A and B are set to one or two lattice layers and C denotes the variation as a function of the buffer insulator layer thickness. Various sets of insulator layers for the insulator with three layers increment were used to calculate the current versus the insulator layer thickness in the parallel spin configuration. ATK DFT results show that the current value is decreasing with the thickness of the insulator layer. Current density crossing the insulator is collected from the transmission spectrum with a 0.1 V fixed voltage between the electrodes and k-point (A, B, C) is (4x4x112), equivalent to 900 k-points. The density mesh cut-off is at 200 eV and the electrodes are kept at a temperature of 300 K. The exchange correlation of the atoms of the insulator are set to DoubleZetaPolarized while the electrodes are set to SingleZetaPolarized. The exchange correlation converges faster if the atoms are set medium. Convergence is reached in each case at iteration step that varies from 3 to 40 steps. The calculated current density is accurate to 0.0001 tolerance when a maximum of 100 steps are used. The current density is higher in electrodes with lower layer indicating higher current density in nano-columns than in thin films. The conductivity dI/ dV versus the applied magnetization at a fixed voltage between the electrodes is required to calculate the MR ratio.

References:

[1] A. Newman, S. Khatiwada, S. Neupane, and D. Seifu, ”Nanowires of Fe/multi-walled carbon nanotubes and nanometric thin films of Fe/MgO,” Journal of Applied Physics 117, no. 14,144302, 2015.

[2] D. Aryee and D. Seifu, "Shape Anisotropy and Hybridization Enhanced Magnetization in Nanowires of Fe/MgO/Fe Encapsulated in Carbon Nanotubes," Journal of Magnetism and Magnetic Materials, 2017.

[3] http://docs.quantumwise.com/tutorials/tutorials.html

Right-Angled Artin Groups and Topological Complexity

Robert Short, Lehigh University

Abstract: Topological complexity is a homotopy invariant introduced by Michael Farber in the early 2000s. Denoted $\mathrm{TC}(X)$, it counts the smallest size of a continuous motion planning algorithm on X. In this sense, it solves optimally the problem of continuous motion planning in a given topological space. In topological robotics, a part of applied algebraic topology, several variants of TC are studied. In a recent paper, I introduced the relative topological complexity of a pair of spaces (X, Y) where $Y \subset X$. Denoted $\mathrm{TC}(X, Y)$, this counts the smallest size of motion planning algorithms that plan from X to Y. Right-angled Artin groups have grown in importance lately with their connections to several different fields of mathematics. In this talk, we will explore some different presentations of right-angled Artin groups, and we use those presentations to discuss the associated topological complexity computations. If we have time, we will compute the relative topological complexity for pairs of right-angled Artin groups and offer a proof of the result.

Introduction to Quantum Field Theory for Mathematicians

Stephen Sorokanich, University of Maryland, College Park

Abstract: Quantum fields are a major tool in particle and condensed matter physics research. They are also responsible for the imprecise mathematical formulation of these theories. This talk will explore the rich connections quantum fields and the modern theory of PDEs, asymptotic analysis, and functional analysis.

Geometry on the Hermitian Metric

Mai Tran, University at Albany

Abstract: Given a bounded linear operator T, its spectrum $\sigma(T)$ is the collection of all complex numbers λ such that $T - \lambda I$ is not invertible. The resolvent set of T is the complement $\rho(T) = C\sigma(T)$. In this talk we will look at some geometry properties of quasi-nilpotent operator and the unilateral shift operator with respect to the Hermitian metric defined on $\rho(T)$ by Ronald Douglas and Rongwei Yang.

A Two-Stage Selection and Testing Procedure for Comparative Clinical Trials
Mingyue Wang and Pinyuen Chen, Syracuse University

Abstract: We propose a hybrid two-stage procedure for selecting the t best of k ($k > t > 1$) experimental Bernoulli treatments and a controlled Bernoulli treatment. The procedure can possibly make an early decision which achieves the same significance level and power as those of a one-stage procedure. We adopt the selection-and-testing design considered by Thall, Simon, and Ellenberg (1988), but with a different goal: selecting among k treatments the t ($t < k$) best treatments and to compare them to the control. The selection stage of the design selects the t best provided that they are significantly better than other treatments and the control. The testing stage tests whether the selected t treatments are superior to the control.

Keywords: Binomial Distribution; Least Favorable Configuration; Ranking and Selection

Polynomial Convexity: Easy to State, Tough to Prove
Chloe Wawrzyniak, Rutgers University

Abstract: A compact set X in $\mathbb{C}^n$ is polynomially convex if for every x outside X, there is a polynomial P such that $|P(x)|$ is strictly larger than the supremum of $|P|$ over X. A natural question is to classify which sets are polynomially convex. In one complex dimension, the answer is well-known. But in dimension 2 and higher, this question is still an area of active research. Many of the proofs in this area are long, technical, and require extra background. So, we will spend most of our time playing with examples while assuming some major results. Time permitting, I will discuss Eva Kallins problem - a tantalizingly easy-to-state open question in the field.

Differentiable stacks, Lie groupoids, and gerbes
Qingyun Zeng, University of Pennsylvania

Abstract: Stacks are introduced to give geometric meaning to higher non-commutative cohomology classes, while groupoid is a generalization of the concepts of spaces and groups. In fact, these two objects have a close relationships in the differentiable world, namely differentiable stacks are Morita equivalence classes of Lie groupoids. We will introduce basic ideas of differentiable stacks and Lie groupoids and then look at gerbes with connection over an an étale stack via noncommutative algebras of differentiable forms on a groupoid presenting the stack. Time permits, we will discuss either Mukai duality of applications to 4-manifolds.

Base for representation ring of maximal tori for semisimple Lie groups
Changwei Zhou, Binghamton University

Abstract: During 1970s Harish Pittie and Robert Steinberg proved for semismiple Lie groups

that are simply connected or of Type B, the representation ring of the maximal tori is a free module over the representation ring of the group itself. The rank of the free module equals the order of the Weyl group. However, no explicit computation was done for ABCDEFG cases. Here I present a canonical basis for Type A. The method is elementary and it may be extended to Type B, C, D, G. The problem arises from studies in equivariant K-theory.