The 29^{th} Annual Great Plains Operator Theory Symposium

Titles and abstracts of 20-minute contributed talks (parallel sessions: in HUM 150, 135, 1B80, and 190)

Tuesday, June 2, Session 1: 2:30 p.m. - 5:20 p.m.: in HUM 150

2:30 p.m. - 2:50 pm: Alex Kumjian, University of Nevada, Reno
Diagonals in type I_0 algebras
Abstract: A C^*-algebra s said to be of type I_0 if it is generated by abelian elements (see Pedersen). Such algebras are similar to continuous trace algebras but they need not have Hausdorff spectra. They arise naturally in the study of certain dynamical systems. We prove that up to Rieffel-Morita equivalence every such algebra contains a diagonal. Moreover, we prove that an abelian subalgebra B of such an algebra A is a diagonal iff it satisfies the extension property (i.e. every pure state of B extends uniquely to a pure state of A). This implies that the twists arising from Rieffel-Morita equivalent algebras of type I_0 containing diagonals are equivalent in a natural sense. This opens the door for a classification of such algebras up to Rieffel-Morita equivalence. Interim report of ongoing joint work with Astrid an Huef and Aidan Sims.

3:30 p.m. - 3:50 p.m. : Jonathan Brown, Dartmouth College
Proper actions of groupoids on C^*-algebras
Abstract: In 1990, Rieffel defined a notion of a proper group dynamical system. In 2008, I generalized this notion to groupoids. In this talk I will present some new results I have obtained in this direction.

4:00 p.m. - 4:20 p.m.: Geoff Goehle, Dartmouth College
Locally unitary groupoid actions
Abstract: This talk presents a generalization of the theory of locally unitary group crossed products to groupoids. We define the notion of a locally unitary groupoid action and describe how these actions are characterized up to equivalence by an associated principal bundle, and therefore by an associated cohomology class.

4:30 p.m. - 4:50 p.m.: Junsheng Fang, Texas A&M University
Groupoid normalizers of tensor products: the general case
Abstract: In a very general setting for inclusions of von Neumann algebras (not necessarily type II_1), we proved that the groupoid normalizer algebra of tensor product is the tensor product of groupoid normalizer algebras. We also characterize fundamental groups of type II_1 factors in terms of normalizers and groupoid normalizers. This is joint work with Roger Smith and Stuart White.

5:00 p.m. - 5:20 p.m.: Julian Buck, University of Oregon
Crossed-Product C^*-algebras by Automorphisms with the Tracial Quasi-Rokhlin Property
Abstract: We introduce the tracial quasi-Rokhlin property for an automorphism α of a

C^*-algebra A, and describe various structure properties of the crossed-product C^* algebra $C^*(\mathbb{Z}, A, \alpha)$. We also show that under certain assumptions on X and A, a class of automorphisms of $C(X, A)$ (coming from a minimal homeomorphism of X and an automorphism of A) have this property.

Tuesday, June 2, Session 2: 2:30 p.m. - 5:20 p.m.: in HUM 135

2:30 p.m. - 2:50 p.m.: Jasang Yoon, University of Texas-Pan American
Generalized Hilbert matrices with applications to multivariable weighted shifts
Abstract: In joint work with R. Curto, we consider infinite symmetric matrices of positive numbers which are natural generalizations of the Hilbert matrix. We obtain a formula for the determinant, together with a new criterion for positive semi-definiteness. We then use these results to characterize k-hyponormality for the powers of 2-variable weighted shifts in a large class of hyponormal shifts with tensor core. Finally, for the special case of one-atomic core, we prove that hyponormality is invariant under all powers.

3:30 p.m. - 3:50 p.m.: Jaydeb Sarkar,Texas A&M University
Hilbert modules similar to the canonical Hilbert module
Abstract: In this talk I will discuss a characterization of m-tuples of Hilbert space operators similar to the canonical shifts like Drury-Arveson shift (for commuting tuples) and Fock space shift (for non-commuting tuples). This talk is based on joint work with Ronald Douglas and Ciprian Foias.

4:00 p.m. - 4:20 p.m.: Zhang Niu, University of Oregon
Lifting KK-elements, asymptotical unitary equivalence and the classification of simple C^*-algebras
Abstract: Two existence theorems concerning KK-elements and rotation maps are proved. More precisely, let A and B be simple unital AH-algebras (with slow dimension growth) of real rank zero. Then any positive element in $\mathrm{KK}(A, B)$ can be lifted to a homomorphism from A to B. Moreover, if A is a unital subalgebra of B, the embedding can be perturbed by an approximated inner automorphism of B to realize any given rotation map, but keep the induced KK-element unchanged. These two existence theorems were used in the classification of simple C^*-algebras which are tracially AF after tensoring a UHF algebra. This is a joint work with Huaxin Lin.

4:30 p.m. - 4:50 p.m.: Alfons Van Daele, K.U. Leuven
Morita equivalence of algebraic quantum groups
Abstract: TBA

5:00 p.m. - 5:20 p.m.: Katie Quertermous, University of Virginia
A C^*–algebra Generated by a Semigroup of Composition Operators
Abstract: We consider the linear–fractional, non–automorphism self–maps of the unit disk that fix a point $\gamma \in \partial\mathbb{D}$. We want to determine the structure of the C^*–algebra generated by the composition operators on $H^2(\mathbb{D})$ induced by this class of maps. In this talk, we investigate a substantial piece of this algebra, namely the C^*–algebra generated by the semigroup $\{C_{\varphi_s}, 0 < s < 1\}$, where $\varphi_s(z) = sz + (1-s)$. The adjoints of these operators are unitarily equivalent to Toeplitz–like operators on the Newton space. By studying the spectral properties of the Toeplitz–like operators, we establish a short exact sequence, $0 \to \mathcal{C} \to C^*\left(\{C_{\varphi_s} : 0 < s < 1\}\right) \to AP(\mathbb{R}) \oplus \mathbb{C}$, where $\mathcal{C}$ is the commutator ideal of $C^*\left(\{C_{\varphi_s} : 0 < s < 1\}\right)$ and $AP(\mathbb{R})$ is the space of almost periodic functions on the real line.

Tuesday, June 2, Session 3: 2:30 p.m. - 5:20 p.m.: in HUM 1B80

2:30 p.m. - 2:50 pm: Robert Powers, University of Pennsylvania
E_0 -semigroups of B(H) of type II_0
Abstract: We consider the problem of classifying the simplest semigroups of *-endomorphisms of B(H) up to cocycle conjugacy.

3:30 p.m. - 3:50 p.m. : Chris Jankowski, University of Pennsylvania
E_0-semigroups induced by q-pure maps on $M_n(\mathbb{C})$: Using q-positive maps
Abstract: ϕ on $M_n(\mathbb{C})$ and boundary weights ν on $B(L^2(0,\infty))$, we define boundary weight maps which naturally nduce E_0-semigroups. We find that particular boundary weight doubles (ϕ, ν) yield uncountably many non-cocycle conjugate type II_0 E_0-semigroups for each $1 < n \in \mathbb{N}$.

4:00 p.m. - 4:20 p.m.: Nicholas Young, Leeds University
Boundary interpolation problems in a half plane
Abstract: I will describe an elementary technique for constructing functions in the Pick class (that is, analytic functions from the upper half plane to itself) with prescribed values at certain points on the real axis. The problem has connections with Hankel matrices, the Hamburger moment problem and operator-monotone functions.

4:30 p.m. - 4:50 p.m.: Mohan Ravichandran, University of New Hampshire
Kadison-Singer algebras: A Generalization of triangular algebras
Abstract: Given a Von Neumann algebra $\mathfrak{M} \subseteq B(H)$, a Kadison-Singer algebra $\mathfrak{A}$ is a maximal reflexive algebra with diagonal $\mathfrak{M}$, ie, $\mathfrak{A}^* \cap \mathfrak{A} = \mathfrak{M}$. Kadison-Singer algebras can be viewed as generalizations of a class of triangular operator algebras, which were introduced by Kadison and Singer in 1960, and also of nest algebras, which have both been extensively studied. In this talk, we construct several examples of Kadison-Singer algebras and show how the subject is intimately related to generator problems in von Neumann algebras. We then give structure results for Kadison-Singer algebras and indicate connections to the isomorphism problem for

the free group factors and the transitive algebra problem.

5:00 p.m. - 5:20 p.m.: Mircea Martin, Baker University

Abstract: The standard Dirac operator $\mathfrak{D} = D_{\text{euc,n}}$ on the Euclidean space $\mathbb{R}^n$, $n \geq 2$, is a first-order differential operator on $\mathbb{R}^n$ with coefficients in the real Clifford algebra $\mathfrak{A}_n(\mathbb{R})$ associated with $\mathbb{R}^n$, that has the defining property $\mathfrak{D}^2 = -\Delta$, where $\Delta = \Delta_{\text{euc,n}}$ is the Laplace operator on $\mathbb{R}^n$. As generalizations of this class of operators we investigate pairs $(\mathfrak{D}, \mathfrak{D}^\dagger)$ of first-order homogeneous differential operators on $\mathbb{R}^n$ with coefficients in a real unital Banach algebra $\mathfrak{A}$, such that either $\mathfrak{D}\mathfrak{D}^\dagger = \mu_L\Delta$ and $\mathfrak{D}^\dagger\mathfrak{D} = \mu_R\Delta$, or $\mathfrak{D}\mathfrak{D}^\dagger + \mathfrak{D}^\dagger\mathfrak{D} = \mu\Delta$, where μ_L, μ_R, or μ are some elements of $\mathfrak{A}$. Such pairs $(\mathfrak{D}, \mathfrak{D}^\dagger)$ will be called *Dirac* or *semi-Dirac pair* pairs of differential operators, respectively. The two typical examples of a Dirac or semi-Dirac pair of differential operators on $\mathbb{R}^n$ are given by $\mathfrak{D} = \mathfrak{D}^\dagger = d + d^*$, or $\mathfrak{D} = d$ and $\mathfrak{D}^\dagger = -d^*$, where d is the operator of exterior differentiation acting on smooth differential forms on $\mathbb{R}^n$, and d^* is its formal adjoint. Our goal is to prove that for any Dirac pair, or semi-Dirac pair, $(\mathfrak{D}, \mathfrak{D}^\dagger)$, we have two *Cauchy-Pompeiu type*, and two *Bochner-Martinelli-Koppelman type* integral representation formulas, one for $\mathfrak{D}$ and, as expected, another for $\mathfrak{D}^\dagger$. In addition, we will show that the existence of such integral representation formulas characterizes the two classes of pairs of differential operators. We should also point out that the concepts of Dirac or semi-Dirac pairs of differential operators have natural extensions in several complex variables and in the setting of differential operators on a Clifford bundle over an oriented Riemannian manifold.

Tuesday, June 2, Session 4: 2:30 p.m. - 4:50 p.m.: in HUM 190

2:30 p.m. - 2:50 pm: Alan Paterson, University of Colorado

An approach to the groupoid equivariant analytic index

Abstract: We show how part of Nigel Higson's proof of the index theorem can be adapted to give the equivariant analytic index for proper groupoids.

3:30 p.m. - 3:50 p.m. : Sooran Kang, University of Colorado

The Yang-Mills functional and Laplace's equation on quantum Heisenberg manifolds

Abstract: In this talk, we discuss the Yang-Mills functional and a certain family of its critical points on quantum Heisenberg manifolds using noncommutative geometrical methods developed by A. Connes and M. Rieffel. In the main result, we construct a certain family of connections on a projective module over the quantum Heisenberg manifold that give rise to critical points of the Yang-Mills functional. We use the "Grassmannian" connection to obtain a set of compatible connections, and introduce "multiplication-type" elements to find a set of critical points of the Yang-Mills functional. Moreover, we show that this set of critical points can be described as a set of solutions to Laplace's equation on quantum Heisenberg manifolds.

4:00 p.m. - 4:20 p.m.: Wei Sun, University of Oregon

On crossed-product C^*-algebras arising from minimal dynamical systems

Abstract: The crossed product C^*-algebra arising from a minimal dynamical system on the product of the Cantor set and $\mathbb{T}^2$ is studied. The tracial rank of one sub-algebra turns out to

be one.

4:30 p.m. - 4:50 p.m.: Ben Mathes, Colby College
Substrictly cyclic algebras
Abstract: We use Banach algebra techniques to recapture results of Kalisch, Sarason, Waterman, and others. These methods lead us to a generalization of strictly cyclic algebras, which we call substrictly cyclic algebras.

Wednesday, June 3, Session 1: 2:30 p.m. - 5:50 p.m.: in HUM 150

2:30 p.m. - 2:50 pm: Igor Nikolaev, The Fields Institute
Noncommutative geometry of algebraic curves
Abstract: A covariant functor from the category of generic complex algebraic curves to a category of the AF-algebras is constructed. The construction is based on a representation of the Teichmueller space of a curve by the measured foliations due to Douady, Hubbard, Masur and Thurston. The functor maps isomorphic algebraic curves to the stably isomorphic AF-algebras.

3:30 p.m. - 3:50 p.m. : Emily Redelmeier, Queen's University
Euler Characteristic Expansion for Real Wishart Random Matrices
Abstract: I will present an expansion for the moments of the real Wishart random matrix ensemble which resembles the genus expansion for complex matrix models, but which includes nonorientable surfaces. I extend the combinatorial machinery for computing the moments algebraically to the nonorientable case.

4:00 p.m. - 4:20 p.m.: John McCarthy, Washington University
Ando's inequality and distinguished varieties
Abstract: A sharp form of Ando's inequality leads to the discovery of "distinguished varieties" in $\mathbb{C}^2$. These turn out to have many connections with both Operator theory and function theory.

4:30 p.m. - 4:50 p.m.: Tao Mei, University of Illinois at Urbana-Champaign
Noncommutative Riesz Transforms and application to Quantumn metic spaces
Abstract: We consider semigroup of operators on a semifinite von Neumann algebra. We study P. A Meyer's gradient form associated with this semigroup and prove a L^p - inequality for it. As consequences, we obtain new examples of quantumn metric spaces.

5:00 p.m. - 5:20 p.m.: Gelu Popescu, University of Texas at San Antonio
Noncommutative hyperbolic geometry on the unit ball of $B(\mathcal{H})^n$
Abstract: We introduce a hyperbolic distance d on the open unit ball $[B(\mathcal{H})^n]_1$, which turns out to be a noncommutative extension of the Poincaré-Bergman distance on the open unit ball of $\mathbb{C}^n$. It is proved that: d is invariant under the action of the free holomorphic automorphism group of $[B(\mathcal{H})^n]_1$,, the d-topology coincides with the usual operator norm topology on

$[B(\mathcal{H})^n]_1$,, and $[B(\mathcal{H})^n]_1$, is a complete metric space with respect d. We obtain an explicit formula for d in terms of the reconstruction operator associated with the right creation operators on the full Fock space with n generators. A Schwarz-Pick lemma for free holomorphic functions on $[B(\mathcal{H})^n]_1$, with respect to the hyperbolic metric is provided. We show that the Carathodory and the Kobayashi distances, with respect to d, coincide with d on $[B(\mathcal{H})^n]_1$, These results will be published in JFA, 2009.

5:30 p.m. - 5:50 p.m.: Matt Mahoney, Dartmouth College
A Composition Formula for Asymptotic Morphisms
Abstract: I will describe a class of asymptotic morphisms of C^*-algebras which are modeled on K-homology elements associated to elliptic operators on manifolds. I will then discuss a composition formula for asymptotic morphisms from this class.

Wednesday, June 3, Session 2: 2:30 p.m. - 5:50 p.m.: in HUM 135

2:30 p.m. - 2:50 pm: Valentin Deaconu, University of Nevada - Reno
Abstract: We define the notion of a Λ-system of C^*-correspondences associated to a higher-rank graph Λ. Roughly speaking, such a system assigns to each vertex of Λ a C^*-algebra, and to each path in Λ a C^*-correspondence in a way which carries compositions of paths to balanced tensor products of C^*-correspondences. Under some simplifying assumptions, we use Fowler's technology of Cuntz-Pimsner algebras for product systems of C^*-correspondences to associate a C^*-algebra to each Λ-system. We then construct a Fell bundle over the path groupoid $\mathcal{G}_\Lambda$ and show that the C^*-algebra of the Λ-system coincides with the reduced cross-sectional algebra of the Fell bundle. We conclude by discussing several examples of our construction arising in the literature.

3:30 p.m. - 3:50 p.m. : Nura Patani, Arizona State University
Characterizing Graph C^*-Correspondences
Abstract: To a directed graph E one can associate a C^*-correspondence X_E called the graph correspondence. We show that every nondegenerate separable C^*-correspondence over a commutative C^*-algebra with discrete spectrum is isomorphic to a graph correspondence. Time permitting, functorial aspects of the characterization are discussed.

4:00 p.m. - 4:20 p.m.: Jack Spielberg, Arizona State University
Groupoids and C^*-algebras for categories of paths
Abstract: We will present a general notion of "graph" from which the basic features of higher-rank graphs, and other examples, can be derived. Our emphasis is on the symbolic dynamics underlying the usual constructions.

4:30 p.m. - 4:50 p.m.: Jacob Shotwell, Arizona State University
Periodicity and ideals in k-graph algebras
Abstract: Finitely-aligned k-graphs were introduced by Raeburn, Sims, and Yeend in order to sensibly associate a C^*-algebra to row-infinite k-graphs. This is currently the broadest class of k-graphs appearing in the literature.

The notion of aperiodicity for k-graph algebras was introduced by Kumjian and Pask in their work introducing higher-rank graph algebras, which are generalizations of the higher-rank Cuntz-Krieger algebras. Since then, a number of aperiodicity conditions have appeared in the literature. Roughly speaking, an aperiodicity condition should be equivalent to essential freeness of the associated groupoid. Such an aperiodicity condition, along with a graph-theoretic definition known as "cofinality" (which guarantees that the associated groupoid is minimal), are enough to yield simple k-graph C^*-algebras.

In this talk, we will introduce a slight generalization of the work by Robertson and Sims for row-finite, locally convex k-graphs. We use our new aperiodicity condition to characterize the simple finitely-aligned k-graph algebra.

A key aspect in the proof of our theorem allows for the introduction of a higher-rank analog of "loop without exit" from the theory of directed graph algebras.

5:00 p.m. - 5:20 p.m.: Mark Tomforde, University of Houston
Classification of graph C^*-algebras with one ideal
Abstract: I will discuss how results of Eilers, Restorff, and Ruiz may be used to classify graph C^*-algebras that contain a unique proper nontrivial ideal. The invariant for classification is the six-term exact sequence of K-groups associated to the short exact sequence determined by the ideal, and we will see how this invariant can be computed for graph C^*-algebras.

5:30 p.m. - 5:50 p.m.: Sam Schmidt, University of Iowa
Endomorphsims, The Toeplitz Algebra and Complication Operators
Abstract: Local homeomorphisms of the unit circle in the complex numbers extend to C^*-endomorphisms of the continuous functions on the cirle. We address the question, when does this endomorphism extend to the Toeplitz algebra in the following sense. Given a local homeomorphism of the circle, σ, when does there exist an endomorphism $\tilde{\sigma}$ of the Toeplitz algebra of the circle so that $\tilde{\sigma}(T_f + k) = T_{f\circ\sigma} + k'$, where $f \in C(\mathbb{T})$ and k and k' are compact operators?

Wednesday, June 3, Session 3: 2:30 p.m. - 5:50 p.m.: in HUM 1B80

2:30 p.m. - 2:50 pm: Aviv Censor, University of California - Riverside
How to measure a groupoid
Abstract: The groupoidification program led by J. Baez and J. Dolan has been successfully applied to several structures, such as Hall algebras and Feynman diagrams. In order to expand the scope of groupoidification, with operator algebras in mind, we take first steps in extending the theory from the realm of discrete groupoids to the topological setting. In particular we

extend the notion of groupoid cardinality, by defining how to measure a topological groupoid. We also show how to assign measures to continuous groupoid homomorphisms. We demonstrate our results on groupoids corresponding to open covers, which have been proven useful in the study of continuous trace C^*-algebras. This is a preliminary report on joint work with Daniele Grandini and Christopher Walker.

3:30 p.m. - 3:50 p.m. : Qihui Li, University of New Hampshire
Topological Free Entropy Dimension in Unital C^*-algebras
Abstract: We discuss recent developments in Voiculescu's topological free entropy dimension.

4:00 p.m. - 4:20 p.m.: Martin McGarvey, Queen's University, Belfast
Normalisers, nest algebras and tensor products
Abstract: If A is an operator algebra acting on a Hilbert space H, a normaliser of A is an operator T on H such that $T*AT$ and $TAT*$ are contained in A. The set of all normalisers of A is denoted by $N(A)$. We will show that if A is the tensor product of finitely many continuous nest algebras, B is a CDCSL algebra and $N(A) = N(B)$ then either $A = B$ or $A = B*$.

4:30 p.m. - 4:50 p.m.: Onur Yavuz, Koc University
When is the range of the operator $I - T$ closed?
Abstract: It is well-known that for a compact operator K on a Banach space X, the range of the operator $I - K$ is closed. For an arbitrary bounded linear operator T, however, this need not be true. So it is natural to ask when the range of the operator $I - T$ is closed. We answer this question in the particular case where T is a contraction. (This is a joint work with Ali Ülger.)

5:00 p.m. - 5:20 p.m.: Anna Skripka, Texas A&M University
Non-commutative Taylor formulas
Abstract: In estimates for the remainder of a Taylor-type approximation of the value of a function f at a self-adjoint operator $H_0 + V$ by Frechet derivatives of $H \to f(H)$ at a self-adjoint operator H_0, it is generally hard to separate contribution of a scalar function f from contribution of the perturbation V. It is known that under certain assumptions on f and V, a trace of the remainder of the approximation by the zeroth order or by the zeroth and first order derivatives is a bounded linear functional evaluated on f' or f'', respectively. The measure representing this functional is absolutely continuous, with the density equal to Krein's or Koplienko's spectral shift function, respectively. In joint work with K. Dykema, we construct spectral shift functions for higher order Taylor remainders in both the traditional and von Neumann algebra settings of the perturbation theory. A natural (as will be explained) restriction on the perturbation in the traditional setting is that V be in the Hilbert-Schmidt class.

Wednesday, June 3, Session 4: 2:30 p.m. - 2:50 p.m.: in HUM 190

2:30 p.m. - 2:50 pm: Roger Roybal, California State University Channel Islands
Invariance of the joint defect index of a tuple of symmetric operators
Abstract: Given a tuple of unbounded symmetric operators, under certain conditions they possess a joint defect index analogous to the single operator case shown by von Neumann. This result stems from work in the multidimensional moment problem, and we use it to show that in that setting the point evaluation on the polynomials are bounded at one point in $\mathbb{C}^d \backslash \mathbb{R}^d$ if and only if point evaluations are bounded throughout $\mathbb{C}^d \backslash \mathbb{R}^d$.

3:30 p.m. - 3:50 p.m.: Meghna Mittal, University of Houston
Operator algebras of functions
Abstract: Many operator algebras of current interest, such as the Arveson-Drury and Schur-Agler algebras, are really operator algebras of functions on their underlying domains. We prove that any operator algebra of functions satisfying certain conditions is residually finite dimensional, a dual operator algebra and is completely isometrically isomorphic to the multiplier algebra of a RKHS. We show that the Arveson-Drury and Schur-Agler algebras satisfy our conditions.

4:00 p.m. - 4:20 p.m.: Pedram Hekmati, Royal Institute of Technology, Stockholm/M.I.T.
Fractional loop group
Abstract: Let G be a compact semi-simple Lie group. We extend the smooth loop group LG to maps with only small differentiability q in the Sobolev sense. In the range $q > \frac{1}{2}$, the usual theory of projective highest weight representations is valid. However, for $0 < q < \frac{1}{2}$, the central extension breaks down and must be renormalized, leading to an abelian extension. I will explain how these group extensions arise and discuss an application to twisted equivariant K-theory on G.

4:30 p.m. - 4:50 p.m.: Raluca Dumitru, University of North Florida
Spectra for compact quantum group coactions
Abstract: We discuss about the Connes and Arveson spectra at the level of compact quantum groups and we present some results on the simplicity and primeness of the crossed product. This is a joint work with Costel Peligrad.

5:00 p.m. - 5:20 p.m.: Ugur Gul, University of Virginia
Approximation of Composition Operators on Reproducing Kernel Hilbert Spaces
Abstract: Integral representation formulas in Spaces of analytic functions that are reproducing kernel Hilbert spaces are used to approximate a certain class of composition operators by linear combinations of Toeplitz operators and convolution operators. The method works in several variables as well.

Friday, June 5, Session 1: 2:30 p.m. - 5:50 p.m.: in HUM 150

2:30 p.m. - 2:50 pm: Thomas Tonev, University of Montana, Missoula
Algebra isomorphisms between standard operator algebras
Abstract: If X and Y are Banach spaces, then subalgebras $\mathcal{A} \subset B(X)$ and $\mathcal{B} \subset B(Y)$, not necessarily unital nor complete, are called *standard operator algebras* if they contain all finite rank operators on X and Y correspondingly. The peripheral spectrum of $A \in \mathcal{A}$ is the set $\sigma_\pi(A) = \{\lambda \in \sigma(A) : |\lambda| = \max_{z \in \sigma(A)} |z|\}$ of spectral values of A of maximum modulus, and a map $\varphi\colon \mathcal{A} \to \mathcal{B}$ is called *peripherally-multiplicative* if it satisfies the equation $\sigma_\pi\big(\varphi(A) \circ \varphi(B)\big) = \sigma_\pi(A\,B)$ for all $A, B \in \mathcal{A}$. We show that any peripherally-multiplicative and surjective map $\varphi\colon \mathcal{A} \to \mathcal{B}$, neither assumed to be linear nor continuous, is a bijective bounded linear operator such that either φ or $-\varphi$ is multiplicative or anti-multiplicative. This holds in particular for the algebras of finite rank operators or of compact operators on X and Y and extends earlier results of Molnár. If, in addition, $\sigma_\pi(\varphi(A_0)) \neq -\sigma_\pi(A_0)$ for some $A_0 \in \mathcal{A}$ then φ is either multiplicative, in which case X is isomorphic to Y, or anti-multiplicative, in which case X is isomorphic to Y^*.

3:30 p.m. - 3:50 p.m. : Ben Mathes, Colby College
Substrictly cyclic algebras
Abstract: We use Banach algebra techniques to recapture results of Kalisch, Sarason, Waterman, and others. These methods lead us to a generalization of strictly cyclic algebras, which we call substrictly cyclic algebras.

3:30 p.m. - 3:50 p.m. : Hutian Liang, University of Oregon
Abstract: Crossed product of C^* -algebras by locally compact groups have been studied widely. When the group is the group of integers $\mathbb{Z}$, and when the C^* -algebras is the continuous functions on compact metric spaces $C(X)$, it is shown that, in some cases, the crossed product has tracial rank zero. The crossed product having tracial rank zero was shown, by Lin and Phillips, by looking at a subalgebra that has a recursive structure. In this presentation, we briefly introduce the crossed product of $C(X)$ by the reals $\mathbb{R}$. We then will discuss how to find a subalgebra of the crossed product of $C(X)$ by $\mathbb{R}$, analogous to the one in the integer case, that has an recursive structure.

4:00 p.m. - 4:20 p.m.: Terry Loring, University of New Mexico
From Matrix to Operator Inequalities
Abstract: We will discuss Loewner's method for proving that matrix monotone functions are operator monotone. We consider broad classes of C^*-relations that are residually finite dimensional. The main result is a meta-theorem about when questions about bounded operators can be reduced to questions about matrices. Applications will be given regarding norms of exponentials, norms of commutators and "positive" noncommutative *-polynomials.

4:30 p.m. - 4:50 p.m.: John Quigg, Arizona State University
Application of coactions to direct integrals
Abstract: For a Fell bundle A over a group G, we construct a Fell bundle $A \times G$ over the transformation groupoid $G \times G$ and a coaction of G on $C^*(A)$. The crossed product $C^*(A) \times G$ is isomorphic to $C^*(A \times G)$. This has an application to direct integrals, since representations of $A \times G$ involve Borel Hilbert bundles. Joint with S. Kaliszewski, P. Muhly, and D. Williams.

5:00 p.m. - 5:20 p.m.: Benton Duncan, North Dakota State University
Nuclearity related properties for nonselfadjoint operator algebras
Abstract: We investigate nonselfadjoint operator algebras and nuclearity related properties using enveloping C^*-algebras. In particular we look at variants of nuclearity, exactness, the local lifting property, and the weak expectation property in this context. This is joint work with David Blecher.

5:30 p.m. - 5:50 p.m.: Dawn Archey, University of Ben-Gurion
Crossed product C^*-algebras and the projection free tracial Rokhlin property
Abstract: We will define the projection free tracial Rokhlin property (an analog of the tracial Rokhlin property suitable for algebras with few projections). Then we will present the following theorem:

Let A be an infinite dimensional stably finite simple unital C^*-algebra such that all 2-quasi-traces are traces, and with only finitely many extreme tracial states. Assume A has stable rank one and strict comparison of positive elements. Let $\alpha : G \to \mathrm{Aut}(A)$ be an action of a finite group with the projection free tracial Rokhlin property. Then $B = C^*(G, A, \alpha)$ also has stable rank one.

Friday, June 5, Session 2: 2:30 p.m. - 5:50 p.m.: in HUM 135

2:30 p.m. - 2:50 pm: Florin Pop, Wagner College
Vanishing of the second cohomology group of a tensor product of von Neumann algebras (joint work with Roger Smith)
Abstract: TBA

3:30 p.m. - 3:50 p.m. : Saikat Mukherjee, University of Wyoming
Some invariance theorems on de Branges-Rovnyak spaces
Abstract: t is well known that the Paley-Wiener spaces arise naturally from Fourier transforms of bandlimited functions and admit the beautiful sampling theorem of Shannon. Sampling theorems arising naturally in such reproducing kernel Hilbert spaces (RKHS) are of fundamental importance. The de Branges- Rovnyak spaces are generalization of the Paley-Wiener spaces exhibiting the RKHS property and are the ranges of interesting linear transforms. In this presentation these transforms will be described, the reproducing kernel of these spaces will be identified and the invariance theorems on such spaces, i.e. the composition operators that send

these spaces into themselves and into Hardy spaces containing these spaces will be discussed.

4:00 p.m. - 4:20 p.m.: Zinaida Lykova, Newcastle University
The higher-dimensional amenability of tensor products of Banach algebras
Abstract: We investigate the higher-dimensional amenability of tensor products $\mathcal{A} \otimes \mathcal{B}$ of Banach algebras $\mathcal{A}$ and $\mathcal{B}$. We prove that the weak bidimension db_w of the tensor product $\mathcal{A} \otimes \mathcal{B}$ of Banach algebras $\mathcal{A}$ and $\mathcal{B}$ with bounded approximate identities satisfies

$$db_w \mathcal{A} \otimes \mathcal{B} = db_w \mathcal{A} + db_w \mathcal{B}.$$

Yu. Selivanov proved that this equality holds for *unital* Banach algebras. We show that it cannot be extended to arbitrary Banach algebras. For example, for a biflat Banach algebra $\mathcal{A}$ which has a left or right, but not two-sided, bounded approximate identity, we have $db_w \mathcal{A} \otimes \mathcal{A} \leq 1$ and $db_w \mathcal{A} + db_w \mathcal{A} = 2$.

4:30 p.m. - 4:50 p.m.: David R. Pitts, University of Nebraska-Lincoln
Abstract: An *inclusion* is an ordered pair $(\mathcal{C}, \mathcal{D})$ consisting of a unital C^*-algebra $\mathcal{C}$ and an abelian C^*-subalgebra $\mathcal{D}$ with $I \in \mathcal{D} \subseteq \mathcal{C}$. Let $\mathcal{N}_{\mathcal{D}}(\mathcal{C}) := \{v \in \mathcal{C} : v\mathcal{D}v^* \cup v^*\mathcal{D}v \subseteq \mathcal{D}\}$ be the set of *normalizers* of $\mathcal{D}$. The inclusion $(\mathcal{C}, \mathcal{D})$ is *regular* if $\overline{\text{span}}\mathcal{N}_{\mathcal{D}}(\mathcal{C}) = \mathcal{C}$.

Call the regular inclusion $(\mathcal{C}, \mathcal{D})$ *an extension inclusion* if $\mathcal{D}$ has the extension property in $\mathcal{C}$ (i.e. every pure state of $\mathcal{D}$ extends uniquely to a state on $\mathcal{C}$). A result of Archbold-Bunce-Gregson shows that whenever $(\mathcal{C}, \mathcal{D})$ is an extension inclusion, there exists a unique conditional expectation $E : \mathcal{C} \to \mathcal{D}$. A *$C^*$-diagonal* is an extension inclusion such that E is faithful. The notion of C^*-diagonal was introduced by Kumjian in a 1986 paper using an equivalent set of axioms; Kumjian showed that C^*-diagonals admit coordinates. Other authors (e.g. Muhly-Solel, Donsig-Pitts) utilized these coordinates in the study of subalgebras of C^*-diagonals.

In this talk, I will introduce a certain ideal of $\mathcal{C}$, the *$\mathcal{D}$-radical* of the inclusion $(\mathcal{C}, \mathcal{D})$, and will discuss the following two results: a) a regular inclusion $(\mathcal{C}, \mathcal{D})$ regularly embeds into an extension inclusion if and only if the relative commutant of $\mathcal{D}$ in $\mathcal{C}$ is abelian; and b) a regular inclusion $(\mathcal{C}, \mathcal{D})$ regularly embeds into a C^*-diagonal if and only if the $\mathcal{D}$-radical of $(\mathcal{C}, \mathcal{D})$ vanishes.

5:00 p.m. - 5:20 p.m.: John Orr, University of Nebraska at Lincoln
Maximal Left Ideals of Nest Algebras
Abstract: This is a progress report on work aimed at better understanding irreducible representations of nest algebras. The relatively small Jacobson radical tells us that nest algebras have many irreducible representations. Can we therefore identify some primitive ideals for nest algebras?

5:30 p.m. - 5:50 p.m.: Wing-Suet Li, Georgia Tech
On Horn inequalities
Abstract: Let A, B, C be $n \times n$ selfadjoint matrices. It was conjectured by Horn in 1962 that the relation $A + B + C = 0$ can be characterized by a set of inequalities (Horn inequalities) together with the trace equality. The conjecture was proved about 10 years ago due to the

work of Klyachko, Knutson and Tao. Recently with H. Bercovici, B. Collins, K. Dykema, and D. Timotin, we show that these inequalities (in appropriate reformulation) are also valid for selfadjoint elements a, b, c with $a + b + c = 0$ in any finite Von Neumann algebra. On the other hand, B. Collins and K. Dykema show that the Connes' embedding problem is equivalent to a matricial form of the above result. In this talk we will discuss some recent results related to Horn inequalities. This is a joint work with H. Bercovici and D. Timotin.

Friday, June 5, Session 3: 2:30 p.m. - 5:50 p.m.: in HUM 1B80

2:30 p.m. - 2:50 pm: Ping Wong Ng, University of Louisiana
Projection Decomposition in Operator Algebras
Abstract: Motivated by the work of Dykema, Freeman, Kornelson, Larson and Ordower on ellipsoidal title frames, we study when a positive operator in a C^*-algebra can be written as a (possibly) infinite sum of (not necessarily pairwise) orthogonal projections.

3:30 p.m. - 3:50 p.m. : Veronika Furst, Fort Lewis College
The trivial intersection property of generalized multiresolution analyses
Abstract: We will discuss the "problem" of Baggett, Bownik, and Rzeszotnik, which explores when a collection of closed subspaces of a Hilbert space satisfies all five requirements of a generalized multiresolution analysis. This is joint work with L.W. Baggett, K.D. Merrill, and J.A. Packer.

4:00 p.m. - 4:20 p.m.: Stephen Avsec, University of Illinois Urbana-Champaign
Fourier Multipliers on Discrete Groups
Abstract: We consider an action of a discrete group G on a real finite-dimensional Hilbert space and a family of completely positive maps associated with it. Using a factorization trick, we can develop many tools from harmonic analysis on $\mathbb{R}^n$ in the setting of the group von Neumann algebra $VN(G)$. This allows us to develop a theory of singular integrals on $VN(G)$.

4:30 p.m. - 4:50 p.m.: Paolo Boggiato, University of Torino
Time-frequency Representations of Wigner Type
Abstract: The talk is based on some recent results about subclasses of the Cohen class of time-frequency representations. In particular we show that there is a general bijection between time-frequency representations and quantizations which associates parameterized Weyl pseudo-differential operators with new time-frequency representations of Wigner type. From the point of view of applications, we show that these representations have the peculiarity that they "split" and "translate" the so-called "ghost frequencies", a fact that we use to define, by integration over the parameter, a representation Q which drastically reduces the problem of "ghost frequencies".

5:00 p.m. - 5:20 p.m.: Victor Kaftal, University of Cincinnati
Perturbations of finite frames and projections
Abstract: Joint work with David Larson. It is known that a finite tight frame which is sufficiently close to being equal-norm (in that the variation of the norms in the frame is small) is close to an equal-norm tight frame. We give a constructive proof of this perturbation result under the additional hypothesis that no two frame vectors are orthogonal. More generally, given a positive finite rank operator $S \in B(H)$, we present a constructive way to decompose it as

$$S = \sum_{j=1}^{n} \xi_j P_j,$$

where P_j are rank-one projections and $\{\xi_j\}_1^n$ is a sequence in $(\mathbb{R}^n)^+$ which is strongly majorized by the eigenvalue list of S. If $\{\xi'_j\}_1^n$ is another such sequence that is close to $\{\xi_j\}_1^n$ and if $P_iP_j \neq 0$ for all i, j, then the construction provides a decomposition $S = \sum_{j=1}^n \xi'_j P'_j$, where the rank-one projections P'_j are close to $P_{\pi(j)}$ for a permutation π. This method provides also another constructive proof of the Schur-Horn Theorem and can be applied to infinite rank operators.

5:30 p.m. - 5:50 p.m.: David R. Larson, Texas A & M University
Projections and frames
Abstract: I will discuss some new results that relate frames for Hilbert space and selfadjoint projections.