GPOTS 2004 Talks

Department of Mathematics
Texas A&M University

BAKER, Richard (baker@math.uiowa.edu) – The University of Iowa

On the classification of p-adic Glimm algebras and p-adic TUHF algebras

Abstract. A spectral theorem is presented for Banach algebra inductive limits of finite-dimensional p-adic UHF and TUHF Banach algebras. This spectral theorem is then used to prove classification results for p-adic Glimm algebras and p-adic TUHF algebras.

BATES, Teresa (teresa@maths.unsw.edu.au) – University of New South Wales

C^*-algebras of graphs and shift equivalence

Abstract. A directed graph $E = (E^0, E^1, r, s)$ consists of countable sets E^0 of vertices, and E^1 of edges, together with maps $s : E^1 \to E^0$ and $r : E^1 \to E^0$ describing where the edges begin and end. Alex Kumjian, David Pask and Iain Raeburn have defined a universal C^*-algebra $C^*(E)$ associated to the directed graph E. These graph C^*-algebras form an important class of examples of C^*-algebras.
In this talk we discuss several graph operations which preserve either the isomorphism or Morita-Equivalence class of the C^*-algebra of the original graph. The operations discussed bear a strong relationship with the study of conjugacy and flow-equivalence in topological dynamics.

BION-NADAL, Jocelyne (bionnada@cmapx.polytechnique.fr) – CMAP Ecole Polytechnique France

A free Girsanov property for free Brownian motion

Abstract. In the context of free probability theory, we prove a "free Girsanov property" for free Brownian motions. The classical Girsanov theorem states that a translated Brownian motion is still a Brownian motion for a new probability equivalent to the given probability, with an exponential density. In the free probability context, we prove that a translated free Brownian motion is still a free Brownian motion for a new trace and that the two traces are asymptotically equivalent. More precisely: Let $((\sigma_t), \tau)$ a free Brownian motion. Let $\tilde{\sigma_t} = \sigma_t + \int_0^t x(s)ds$. We prove that there is a new trace $\tilde{\tau}$ such that the joint distribution of $(\tilde{\sigma_t}, x(s))$ for $\tilde{\tau}$ is the same as the joint distribution of $(\sigma_t, x(s))$ for τ. Furthermore,

$$(C[\sigma_t, x(s)], \tau) = \lim_{n\to\infty} (C[Y_{(n,t)}, D_{(n,s)}], \phi_n)$$

and

$$C[\sigma_t, x(s)], \tilde{\tau}) = \lim_{n\to\infty} (C[Y_{(n,t)}, D_{(n,s)}], \tilde{\phi}_n)$$

where the $Y_{(n,t)}$ are random matrices with coefficients in a free product, $D_{(n,s)}$ are diagonal matrices, and for each n $\tilde{\phi}_n$ is obtained from ϕ_n by a change of probability with exponential density. Remark: The two traces cannot be equivalent in the usual sense because the von Neumann algebra of a free Brownian motion is a factor.

Bion-Nadal Jocelyne: "A free Girsanov property for free Brownian motions" (preprint 2004)

BLECHER, David (dblecher@math.uh.edu) – University of Houston

New tools for operator algebras

Abstract. The relatively new theory of operator spaces includes operator algebras (self-adjoint or otherwise), and many of the most important modules over operator algebras, as particular examples; and naturally leads to a development of a general theory of operator algebras. We discuss the status of this general theory, some of the recent progress, and some intriguing open problems.

BROWN, Nate (nbrown@math.psu.edu) – Penn State University

C-algebras, finite dimensional approximations and applications*

Abstract. Finite dimensional approximations have been a fundamental tool in operator algebras for a long time. However, in the last few years there have been some novel and surprising applications of very technical approximation properties of C^*-algebras. I will give a survey of some of these recent results.

BU, Qingying (qbu@olemiss.edu) – University of Mississippi

The Littlewood-Orlicz operator ideal

Abstract. A continuous linear operator from a Banach space X to a Banach space Y is called *Littlewood-Orlicz* if it takes members in $\ell_1 \check{\otimes} X$, the injective tensor product of ℓ_1 with X, into members in $\ell_2 \hat{\otimes} Y$, the projective tensor product of ℓ_2 with Y. In this talk, we will give several examples and show several properties of Littlewood-Orlicz operators and their relationships to other operators.

CHO, Ilwoo (ilcho@math.uiowa.edu) – University of Iowa

Abstract. The moments of the generating operator of amalgamator free product space of two copies of $L(F_2)$ over $L(F_1)$, under compatibility. In this talk, we will compute the (scalar-valued) moments of the generating operator $T = a + b + a^{-1} + b^{-1} + c + d + c^{-1} + d^{-1}$ of the amalgamated free product of two copies of free group von Neumann algebras $L(F_2) = L(\langle a, b\rangle) = L(\langle c, d\rangle)$ over $L(F_1)$, where F_n is the free group with n-generators. As frameworks, we will consider the amalgamated R-transform calculus and amalgamated even random variables. As outputs, we have the amalgamated moment series of "T" and the amalgamated R-transform of "T". To find the coefficients (amalgamated cumulants) of T, we construct recurrence relations and by using these

recurrence relations, we can compute the partition-dependent amalgamated moments of T. Notice that by defining the suitable conditional expectation from our amalgamated free product space onto $L(F_1)$ which is compatible with the canonical trace, we can compute the (scalar-valued) moments of "T". Here, we will define the amalgamated R-transforms (and amalgamated moment series) slightly different from the original definition of Voiculescu and Speicher. Remark that we use the combinatorial approach to get those results.

CONSTANTINESCU, Tiberiu (tiberiu@utdallas.edu) – University of Texas at Dallas

Positive definite kernels, their factorization, and orthogonal polynomials

Abstract. We deal with the following topics: The structure of positive definite kernels, their spectral factorization and Kolmogorov decomposition; algebraic and asymptotic properties of orthogonal polynomials associated to a positive definite kernel.

COOK, James (james.w.cook@ua.edu) – University of Alabama

Operator-theoretic proofs and extensions of some results of Chernyavskaya and Shuster

Abstract. Using a standard theory of differential operators in Lebesgue spaces, we reprove and generalize a result of Chernyavskaya and Shuster giving a necessary and sufficient condition that the operator defined by the Sturm-Liouville expression $-y'' + qy$ be continuously invertible in $L^p(\mathbb{R})$, $p \in [1, \infty)$, as well as a 1991 result of Shuster showing that the classic Molchanov condition for compact invertibility in L^2 is also necessary and sufficient for a compact inverse in the case $p \neq 2$. (Joint work with R.C. Brown.)

CRIST, Randall (crist@creighton.edu) – Creighton University

Von Neumann and noncommutative geometry

Abstract. This talk will be historical in nature. Starting with an outline of the changing notion of space in mathematics, a letter of von Neumann to Dirac will be the focus of this presentation, where the notion of noncommuting space variables make their first appearance. These ideas will be compared with later approaches, which were the precursors to noncommutative geometry.

CURTO, Raul (rcurto@math.uiowa.edu) – University of Iowa

Jointly hyponormal pairs of commuting subnormal operators need not be jointly subnormal

Abstract. In joint work with Jasang Yoon, we construct three different families of commuting pairs of subnormal operators, jointly hyponormal but not admitting commuting normal extensions. Each such family can be used to answer in the negative a 1988 conjecture of R. Curto, P. Muhly and J. Xia. We also obtain a sufficient condition under which joint hyponormality does imply joint

subnormality. Our tools include the use of 2-variable weighted shifts, the six-point test for joint hyponormality, disintegration of measures techniques, the theory of multivariable moment problems, and matrix positivity.

DAVIDSON, Ken (krdavids@cs.uwaterloo.ca) – University of Waterloo

A Kaplansky Theorem for free semigroup algebras

Abstract. A free semigroup algebra is the unital weak operator topology closed algebra generated by n isometries with pairwise orthogonal ranges. We show that the unit ball of the norm closed algebra is weakly dense in the ball of the weak operator closure in most cases. It fails only when the weak closure is a von Neumann algebra but it has an absolutely continuous part—and no examples of this phenomenon are known to exist.

DEACONU, Valentin (vdeaconu@unr.edu) – University of Nevada, Reno

C^*-algebras of commuting endomorphisms

Abstract. Given a compact space X and two commuting continuous open surjective maps $\sigma_1, \sigma_2 \colon X \to X$, we construct certain C^*-algebras that reflect the dynamics of the $\mathbb{N}^2$-action. When the maps σ_1, σ_2 are local homeomorphisms, these are groupoid algebras, but in general, we feel that a Cuntz-Pimsner algebra associated to a product system of Hilbert bimodules in the sense of Fowler is appropriate. The motivating example for our construction is the dynamical system associated with a rank two graph by Kumjian and Pask. We consider also a two-dimensional subshift of Ledrappier, the case of two covering maps of the circle, and the two-dimensional Bernoulli shift.

DEAN, Andrew (andrew.dean@lakeheadu.ca) – Lakehead University

Classification of C^*-dynamical systems

Abstract. We shall discuss the problem of using invariants to classify various kinds of C^*-dynamical system.

DOUGLAS, Ronald (rgd@tamu.edu) – Texas A&M University

Essentially reductive Hilbert modules

Abstract. Consider a Hilbert module obtained as the completion of the polynomials $C[z]$ in m-variables for which the monomials are orthogonal. If the commuting weighted shifts defined by the coordinate functions are essentially normal, then the same is true for their restrictions to invariants subspaces spanned by monomials. This generalizes the result of Arveson in which the Hilbert space is the m-shift Hardy space. He establishes his result for the case of finite multiplicity and shows the self-commutators lie in the Schatten p-class for $p > m$. We establish our result at

the same level of generality. We also discuss the K-homology invariant defined in these cases.

DUNCAN, Benton (bduncan@math.unl.edu) – University of Nebraska Lincoln

Automorphisms of free semigroup algebras

Abstract. We will use analytic functions on an appropriate Banach space to study the completely isometric automorphisms of the free semigroup algebra $\mathcal{L}_n$. If time permits we will discuss automorphisms of the free semigroupoid algebras of Kribs and Power.

DUTKAY, Dorin Ervin (ddutkay@math.uiowa.edu) – The University of Iowa

Wavelets on fractals

Abstract. Using the multiresolution techniques from the real line, we construct orthonormal bases on a class of affine fractals. Even though there are algebraic similarities to the classical case, the affine structure on fractals is much more rigid and fewer wavelets can be constructed. The distinction comes from an analysis of the invariant measures of the associated Ruelle operator.

EPHREM, Menassie (menassie@coastal.edu) – Coastal Carolina University

C^*-algebra of the $\mathbb{Z}^2$-tree

Abstract. Let $\Lambda = \mathbb{Z}^2$ with lexicographic ordering, which is a totally ordered group. Let $X = \Lambda^+ * \Lambda^+$. Then X is a Λ-tree. Motivated by the formulation of graph C^*-algebras, we form a groupoid whose unit space is the space of ends of the tree. The C^*-algebra of the Λ-tree is defined as the C^*-algebra of the groupoid. Looking at the gauge action on the C^*-algebra, we prove that the fixed-point algebra is an AF algebra. Moreover, the crossed product by the gauge action is also an AF algebra. The C^*-algebra of the tree is simple, purely infinite, nuclear and classifiable.

EXEL, Ruy (exel@mtm.ufsc.br) – Universidade Federal de Santa Catarina

Associativity of crossed products by partial automorphisms

Abstract. In a purely algebraic setting the associativity of partial crossed products is not always automatic. However, under certain hypothesis, one can prove that partial crossed products are associative.

FARTHING, Cynthia (cfarthin@math.uiowa.edu) – University of Iowa

Higher-rank graph C^*-algebras: An inverse semigroup and groupoid approach

Abstract. Inspired by the work of Paterson on C^*-algebras of directed graphs, we show how to associate an inverse semigroup S_Λ to a finitely aligned k-graph Λ. We construct a groupoid $\mathcal{G}_\Lambda$ from an action of S_Λ on the collection of paths of Λ. We show that the C^*-algebra of the groupoid is isomorphic to the Toeplitz algebra of Λ and that the C^*-algebra of a reduction of the groupoid is isomorphic to the Cuntz-Krieger algebra of Λ. This work provides a groupoid model for the Cuntz-Krieger algebras of finitely-aligned k-graphs, extending the work of Kumjian and Pask. It also provides an alternate view of these Cuntz-Krieger algebras than what is given in the work of Raeburn, Sims and Yeend.

FERGUSON, Sarah (shfergie@nyc.rr.com) – College of Staten Island (CUNY)

Hankel forms and quotient modules

Abstract. This talk involves exploiting a particular isomorphism between the Hardy space of the bidisk and a direct sum of weighted Bergman spaces on the disk in order to find analytic boundedness criteria for Hankel forms on the bidisk. The isomorphism is not a superficial change of co-ordinates. It is built from higher-order restriction maps with rich intertwining properties which allows one to replace a Hankel form on the bidisk with a matrix of higher-order Hankel forms acting on pairs of standard weighted Bergman spaces on the disk. The objective is to replace a product BMO condition with a matricial Bloch estimate. The isomorphism also provides a concrete class of quotient modules of the Douglas-Misratype where the nilpotent action is explicitly worked out.

FLORICEL, Remus (floricel@uottawa.ca) – University of Ottawa

The generating property for semigroups of endomorphisms on von Neumann algebras

Abstract. We say that an E_0 semigroup $\{\rho_t\}_{t\in\mathbb{R}_+}$ acting on a von Neumann algebra has the generating property if M is generated by the tower of relative commutants $\{\rho_t(M)'\cap M\}_t$. My purpose in this talk is to discuss the relation between cocycle conjugate and conjugate E_0-semigroups with the generating property.

HAAGERUP, Uffe (haagerup@imada.sdu.dk) – University of Southern Denmark

Applications of random matrices to problems in C-algebras*

Abstract. Thanks to Voiculescu's pioneering work on free probability and free entropy, random matrices have played a key role in von Neumann algebra theory since 1991. In 2002 Steen Thorbjørnsen and I obtained a refined version of Voiculescu's random matrix model for free semicircular systems, which makes it applicable to problems in C^*-algebras too. Our main application is that the Brown-Douglas-Fillmore Ext-invariant for the reduced C*-algebra $C^*_r(F_2)$ of the free group on 2 generators is not a group, but only a semigroup. This problem had been open since Joel

Anderson constructed the first example of a unital C^*-algebra A for which $\mathrm{Ext}(A)$ is not a group in 1978. By further developing these random matrix methods, Hanne Schultz, Steen Thorbjørnsen and I have recently obtained anew proof of the result that $C_r^*(F_2)$ has no non-trivial projections. This was originally proved by Pimsner and Voiculescu in 1982 by methods from K-theory.

HADWIN, Don (don@math.unh.edu) – University of New Hampshire

A general view of multiplications and composition operators

Abstract. (Joint work with Eric Nordgren). We define a very general setting with a multiplication on a Banach space X where the products lie in a possibly larger Hausdorff topological vector space Y. We also define a very general notion of composition operator in this setting. We prove some general results, including results on local multiplications and local composition operators. In some cases there is a very natural choice of Y (a Banach space) called a cospace of X. We examine when cospaces exist. Applications include measure spaces, Hardy and Bergmann spaces, free semigroup algebras, strictly cyclic algebras, and finite factor von Neumann algebras.

HAMID, Sami (hamid@math.tamu.edu) – Texas A&M University

(BCP)-operators and the hyperinvariant subspace problem

Abstract. Recently Foias and Pearcy proved that if there exists $0 \leq \theta \leq 1$ such that every C_{00}, (BCP)-operator T on a Hilbert space $\mathcal{H}$ whose essential spectrum satisfies $\sigma_e(T) = \mathbb{A}_\theta = \{\xi \in \mathbb{C}\colon\ \theta \leq |\xi| \leq 1\}$ has a nontrivial hyperinvariant subspace (n.h.s.), then every nonscalar operator $A\colon\ \mathcal{H} \to \mathcal{H}$ has a n.h.s. They used a new equivalence relation, ampliation quasisimilarity, more general than quasisimilarity, which preserves the existence of n.h.s., together with the theory of closed similarity orbits of operators. Subsequently, the speaker, working with C. Onica and Pearcy, partially improved this result as follows: If every C_{00}, quasidiagonal, (BCP)-operator T on $\mathcal{H}$ such that $\sigma_e(T)$ is the closed unit disc has a n.h.s., then every nonscalar operator on $\mathcal{H}$ has n.h.s. As a corollary, we obtained the result that there exist a fixed C_{00}, quasidiagonal, (BCP)-operator T_0 on $\mathcal{H}$ such that if every operator of the form $T_0 + K$, where K is compact and $\|K\| < \varepsilon$, has a n.h.s., then every nonscalar operator on $\mathcal{H}$ has a n.h.s. The main ingredient here is a new structure theorem for (BCP)-operators under ampliation quasisimilarity.

HERNÁNDEZ, Carlos (carlosh@servidor.unam.mx) – UNAM, Mexico

Adjugates of commuting-block matrices

Abstract. Given a commutative ring L, let $K = L^{m\times m}$ and $T \in K^{n\times n}$. The matrix T can be regarded also as a matrix over L. We calculate the adjugate of T over L ($\mathrm{adj}_L\, T$) in terms of the adjugate of T over K and the determinant of T over K. In the case when the entries of T commute, we obtain

$$\mathrm{adj}_L \det_K(T)\ \mathrm{adj}_K(T) = \mathrm{adj}_L(T) = \mathrm{adj}_K(T)\ \mathrm{adj}_L \det_K(T)\ ,$$

and see that this formula is equivalent to the formula

$$\det_L(T) = \det_L \det_K(T)$$

given by Kovacs, Silver and Williams. We also consider the case

$$T = \begin{pmatrix} A & N \\ M & B \end{pmatrix}$$

where . $A \in R^{k\times k}$, $B \in R^{\ell\times\ell}$, $M \in R^{k\times\ell}$ and $N \in R^{\ell\times k}$ and obtain formulas for the determinant and the adjugate of T. This work was done jointly with Robin Harte and Elena de Oteyza.

HOPENWASSER, Alan (ahopenwa@bama.ua.edu) – University of Alabama

The Cuntz algebra as a partial crossed product and related subalgebras

Abstract. I will describe one way to realize the Cuntz C^*-algebra O_n as a partial crossed product constructed from the partial action of a non-abelian countable group acting on a Cantor set. I will then relate the partial crossed product structure to several non-self-adjoint subalgebras of O_n.

HUNG, Ching-Nam (cnhung@math.toronto.edu) – University of Toronto

The numerical range and the core of Hilbert-space operators

Abstract. The talk will be largely based on my Ph.D. thesis research and is about the numerical range of Hilbert-space operators. We will first discuss a structure theory about the core of numerical contractions obtained by T. Ando in 1973. We extend his result and examine the geometric and algebraic properties of operators. We give explicit expressions for the minimum and the maximum of the core. The expressions are given as strongly convergent non-commutative operator series. The main tool employed is the theory of Schur complement of positive operator matrices. After that, we will discuss matrices with the closed unit disk as numerical range. We provide a structural expression for those matrices. We investigate their norm and obtain an explicit expression for the minimum norm bound.

HUSAIN, Ali-Amir (husain@math.tamu.edu) – Texas A&M University

On the cohomology of operator algebras

Abstract. By analogy with topological spaces, Frank Gilfeather and Roger Smith defined the join $\mathcal{A} * \mathcal{B}$ of operator algebras $\mathcal{A}$ and $\mathcal{B}$. When $\mathcal{B}$ acts on a finite dimensional Hilbert space, the Hochschild cohomology groups of the join were expressed in terms of the cohomology groups of $\mathcal{A}$ and $\mathcal{B}$. We replace the complex scalars with a maximal abelian von Neumann algebra $\mathfrak{A}$ acting on $\mathcal{H}$ and redefine the join in this new context. Assuming that $\mathcal{A}$ is an arbitrary closed subalgebra of $\mathfrak{A}\overline{\otimes}\mathcal{L}(\mathcal{K})$ and $\mathcal{B}$ is an ultraweakly closed subalgebra of $\mathfrak{A}\overline{\otimes}M_n(\mathbb{C})$ containing $\mathfrak{A} \otimes 1_n$, we calculate the cohomology groups of their join.

ILIE, Monica (ilie@math.tamu.edu) – Texas A&M University

Completely bounded homomorphisms of the Fourier algebras

Abstract. Given a locally compact group G, the Fourier and Fourier-Stieltjes algebra of G are defined as spaces of coefficient functions associated with continuous unitary representations of G. In the same time, they can also be looked at as preduals of certain von Neumann algebras and, consequently, they have a natural operator space structure. For any pair of locally compact groups G and H, any continuous piecewise affine map $\alpha\colon\ Y \subset H \to G$ induces a completely bounded algebra homomorphism between the Fourier algebras. We show that if G is amenable then any completely bounded algebra homomorphism between the Fourier algebras is of this form, generalizing results of P.J. Cohen, B. Host and of the speaker. This talk is based on joint work with Nico Spronk.

IONESCU, Marius (mionescu@math.uiowa.edu) – University of Iowa

Morita equivalence, iterated function systems and operator algebras

Abstract. We describe a method for associating some non self adjoint algebras to iterated function systems and we study the Morita equivalence of these algebras. We also investigate the relationship between the Morita equivalence of the C^*-correspondences associated to iterated function systems and the dynamical properties of the iterated function systems.

ITZÁ-ORTIZ, Benjamín (bitzaort@uottawa.ca) – University of Ottawa

Minimal homeomorphisms and K-theory

Abstract. Given a minimal homeomorphism S of a compact metric space X and a strictly positive continuous function f on X, there is a standard way to construct a minimal flow (Y, T) called the "suspension flow of S built under the function f." In this talk we will show that for a given S-invariant trace τ on $C(X)$ there is a constant c such that the set

$$\{0\} \cup \{t \in \mathbb{R} \setminus \{0\}\colon T^{\frac{1}{t}} \text{ is not minimal}\}$$

is a countable $\mathbb{Q}$-linear subspace of

$$\{cr\tau_*(x)\colon r \in \mathbb{Q},\ x \in K_0(C^*(\mathbb{Z}, X, S))\}.$$

IVANESCU, Cristian (cristian@math.toronto.edu) – University of Toronto

On the classification of simple C^*-algebras which are inductive limits of continuous-trace C^*-algebras

Abstract. A classification is presented of certain separable nuclear C^*-algebras not necessarily of real rank zero. Also an isomorphism theorem for building blocks will be discussed. This isomorphism is an important ingredient of the proof of the isomorphism theorem for inductive limits

C^*-algebras.

JUNG, KENLEY (factor@math.berkeley.edu) – University of California, Berkeley

Free Hausdorff entropy estimates

ABSTRACT. I will discuss bounds for the free Hausdorff entropy of a single selfadjoint operator in terms of the logarithmic energy of its measure. I will also briefly describe how such estimates become additive for a free family of selfadjoints.

JUNGE, MARIUS (junge@math.uiuc.edu) – University of Illinois - Urbana, Champaign

Where is the connection between operator spaces and type III von Neumann algebras?

ABSTRACT. Research in recent years shows that type III von Neumann algebras occur naturally in the context of operator spaces. Indeed, the old fashioned (but still fascinating) Araki-Woods factors have exactly the kind of flexibility needed for embedding quotients of $R \oplus C$ (the direct sum of the row and column Hilbert space) into the predual of a hyperfinite von Neumann algebra. Together with Pisier/Shlyahktenko's Grothendieck theorem for operator space this provides an analogue of Grothendieck's characterization of Hilbert spaces: An operator space X and its dual embed completely isomorphically in the predual of a hyperfinite von Neumann algebra (noncommutative L_1 space) if and only if X is a subspace of a quotient of $R \oplus C$. The embedding can be achieved using CCR, CAR relations or q-free Gaussian variables. The construction is even easier using Shlyahktenko's free quasi-free factors. However, Pisier showed recently that OH does not embed into the predual of a semifinite von Neumann algebra. Type III objects are indeed necessary! The embedding of OH using free probability is of in particular interest for it reveals properties of jointly completely bounded sesquilinear forms on injective von Neumann algebras which differ 'logarithmically' from their commutative counterparts.

JURY, MICHAEL (jury@math.purdue.edu) – Purdue University

C^*-algebras generated by groups of composition operators

ABSTRACT. For a discrete group Γ of Möbius transformations of the unit disk, (e.g. $PSL(2,\mathbb{Z})$), we consider the C^*-algebra Φ_Γ generated by composition operators with symbols in Γ, acting on the Hardy space. When Γ is non-elementary, Φ_Γ contains the unilateral shift, and hence the ideal of compact operators. We show that Φ_Γ is an extension of the crossed product C^*-algebra $C(\mathbb{T}) \times \Gamma$ by the compacts. We discuss some properties of these crossed products and extensions, connections with Cuntz-Krieger algebras, and consider the problem of classifying these extensions up to isomorphism using K-theory.

KALISZEWSKI, Steve (kaliszewski@asu.edu) – Arizona State University

Extensions of representations of C^*-dynamical systems

Abstract. Given a C^*-dynamical system (A, G, α), a closed subgroup H of G, and a covariant representation (π, U) of (A, H, α), we consider the question: For which closed subgroups K of G does there exist a representation V such that (π, V) is covariant for (A, K, α) and such that V is an extension of U? For normal H, we use non-abelian duality give an answer in terms of the induced representation $\mathrm{Ind}_H^G(\pi \times U)$. For non-normal H, and for the related question involving covariant representations of coactions, several interesting issues arise which are related to crossed products by coactions of homogeneous spaces. This is a preliminary report on work with Astrid an Huef, Iain Raeburn, and Dana P. Williams.

KALTON, Nigel (nigel@math.missouri.edu) – University of Missouri

Two examples in the theory of sectorial operators

Abstract. We will sketch the underlying ideas in the construction of two examples of sectorial operators on a Banach space with the property that they admit an $H^\infty-$ calculus but only for an angle strictly bigger than the angle of sectoriality. This answers a question originally asked by Cowling, Doust, McIntosh and Yagi in 1996. The second counterexample also shows that the angle of Rademacher sectoriality can be strictly bigger than the angle of sectoriality. (Partly joint work with Lutz Weis)

KAMINKER, Jerry (kaminker@math.iupui.edu) – Indiana University Purdue University Indianapolis

Index theory and duality

Abstract. We will review how duality appears in noncommutative geometry and describe some index theoretic results related to it.

KANEDA, Masayoshi (mkaneda@math.uci.edu) – University of California, Irvine

Extreme points of the unit ball of a quasi-multiplier space

Abstract. What are the possible operator algebra products which a given operator space can be equipped with? This is the question which I had been bearing since GPOTS 2002. In late 2002, V.I. Paulsen defined quasi-multipliers for operator spaces, and suggested to me to study them as a part of study of multipliers for operator spaces which was initiated by D.P. Blecher, and developed by himself and V.I. Paulsen and some others including me. Then, accidentally I discovered that quasi-multipliers can be used to characterize operator algebra products. That is, the possible operator algebra products which a given operator space can be equipped with are precisely the bilinear mappings that are implemented by the contractive quasi-multipliers of the operator space. These facts are presented in the joint paper [Kaneda-Paulsen 2003, to appear in Journal of Functional

Analysis]. Moreover, I found that there is a beautiful geometrical characterization of operator algebra products using the Haagerup tensor product. That is, operator algebra products are described only in terms of matrix norms and completely contractive mappings. The last result is elegant enough to obtain a generalization of Blecher-Ruan-Sinclair Theorem as a simple corollary, and also can be considered as the "quasi" version of Blecher-Effros-Zarikian's tau trick theorem in which they characterized one-sided multipliers only in terms of matrix norms and completely contractive mappings. In my characterization, using the Haagerup tensor product is essential, and this fact reminds us that the Haagerup tensor product is a very meaningful concept in study of operator spaces. All these results were presented in GPOTS 2003. After my talk, G.K. Pedersen asked a good question: What are the extreme points of the unit ball of a quasi-multiplier space? This gave me a further direction to study quasi-multipliers, and I have been studying this topic with ideas inspired by a famous characterization of the extreme points of C^*-algebras by R.V. Kadison. In this GPOTS 2004, I will present the best answer I have so far to Pedersen's question.

KATSURA, Takeshi (katsura@math.sci.hokudai.ac.jp) – Hokkaido University

C^*-algebras generated by scaling elements

Abstract. In 1967, Coburn proved that the C^*-algebra generated by a proper isometry does not depend on the choices of isometries by using the Wold decomposition of isometries. In 1982, Blackadar and Cuntz introduced the notion of "scaling elements," which is a generalization of proper isometries. Scaling elements play an important role for finding a proper (partial) isometry in a given C^*-algebra. In this talk, we generalize the Wold decomposition and Coburn's theorem to scaling elements. We also determine when the C^*-algebra generated by a scaling element contains a proper partial isometry.

KOESTLER, Claus (koestler@mast.queensu.ca) – Queen's University

Non-commutative white noises and Arveson's product systems

Abstract. Non-commutative white noises are operator algebraic dynamical systems. Their dynamics is given by a shift and their filtration carries a stochastic independence structure in parallel to the notion of commuting squares in subfactor theory. Such noises are non-commutative generalizations of noises in classical probability theory, e.g., as they are considered by Tsirelson. In my talk I will show that non-commutatives white noises lead to examples of Arveson's product systems. Moreover, I will show that isometric multiplicative shift cocycles are units in the sense of Arveson and that the dimension of the vector space of additive shift cocycles is the index I_n of the corresponding product system of Hilbert spaces.

KORNELSON, Keri (keri@math.tamu.edu) – Texas A&M University

Frames with specified norms and rank-one decomposition of operators

Abstract. The ways in which positive linear operators can be written as sums of positive rank-one operators directly correspond to the existence of Hilbert space frames with certain properties. Moreover, an algorithm which decomposes an operator into a sum of rank-one operators has, in

effect, constructed the associated frame. In particular, we use this correspondence to determine when a frame exists with a given frame operator and whose elements have a prescribed sequence of norms.

KOVACS, Steve (kovacs@ms.uky.edu) – University of Kentucky

Invertibility preserving maps of C-algebras*

Abstract. In 1996 Harris and Kadison posed the following problem: Show that a linear bijection between C^*-algebras that preserves the identity and the set of invertible elements is a Jordan isomorphism. We show that if A and B are semisimple Banach algebras and L is a linear map from A onto B that preserves the spectrum of elements, then L is a jordan isomorphism if either one of A or B is a C^*-algebra with real rank zero. We also generalize a theorem of Russo.

LAUZON, Michael (mlauzon@math.brown.edu) – Brown University

Common complements of two subspaces of a Hilbert space

Abstract. We find a necessary and sufficient condition for two closed subspaces, $\mathcal{X}$ and $\mathcal{Y}$, of a Hilbert space $\mathcal{H}$ to have a common complement, i.e. a subspace $\mathcal{Z}$ having trivial intersection with $\mathcal{X}$ and $\mathcal{Y}$ and such that $\mathcal{H} = \mathcal{X} + \mathcal{Z} = \mathcal{Y} + \mathcal{Z}$. Unlike the finite dimensional case the condition is significantly more subtle than simple equalities of dimensions and codimensions, and non-trivial examples of subspaces without a common complement are possible. This is joint work with Sergei Treil.

MASSEY, Pedro (massey@mate.unlp.edu.ar) – Universidad Nacional de La Plata

Jensen's type inequalities and mayorization

Abstract. Joint work with J. Antezana and D. Stojanoff. Let $\mathcal{A}$ and $\mathcal{B}$ be unital C^*-algebras. Let $\Phi\colon \mathcal{A} \to \mathcal{B}$ be a unital positive map and $\mathcal{E}\colon B \to \mathcal{C}$ be a conditional expectation onto the unital C^*-subalgebra $\mathcal{C}$. Let $\mathcal{B}^{\mathcal{E}} = \{b \in \mathcal{B}\colon \mathcal{E}(ab) = \mathcal{E}(ba), \forall a \in M\}$ denote the centralizer of $\mathcal{E}$. Then, for every convex function $f\colon I \to \mathbb{R}$ (I is an open interval) and every selfadjoint element $a \in \mathcal{A}_{sa}$ such that $\sigma(a) \subseteq I$ and $\Phi(a) \in \mathcal{B}^{\mathcal{E}}$, then the following inequality

$$\mathcal{E}(g[\Phi(f(a))]) \geq \mathcal{E}(g[f(\Phi(a)]) \qquad \text{(usual order)}$$

holds for every increasing convex function g such that $\mathrm{Dom}(g) \subseteq \mathrm{Im}(f)$. If we assume further that $\mathcal{B} = \mathcal{M}$ is a finite factor then, by taking $\mathcal{E} = \tau$ (the normalized trace of $\mathcal{M}$) in the equation above, we obtain the following Jensen's type inequality

$$\Phi(f(a)) \succ f(\Phi(a)) \qquad \text{(submajorization)}$$

where $\succ$ denotes the submajorization preorder in the selfadjoint part of $\mathcal{M}$ (see [1]). Moreover, if $0 \in I$ and $f(0) \leq 0$ then the above inequalities still hold for contractive positive maps. The proof relies on the familiar lower approximation property of convex functions by linear functions. These inequalities are related with some recent results obtained in the matrix analysis context [2], and general operator theory [3]. We also present extensions of these inequalities in the several variable case.

References

[1] Eizaburo Kamei, Majorization in finite factors, Math. Japonica 28, No. 4 (1983), 495-499.
[2] Jaspal Singh Aujla and Fernando C. Silva, Weak majorization inequalities and convex functions, Linear Algebra Appl. 369 (2003), 217-233.
[3] Frank Hansen and Gert K. Pedersen, Jensen's operator inequality, Bulletin of London Mathematical Society 35 (2003), 553-564.

MATHIEU, Martin (m.m@qub.ac.uk) – Queen's University Belfast

Commutators with finite spectrum

Abstract. We report on a joint paper with Nadia Boudi which is going to appear in Illinois J. Math. We study the properties of a (bounded) derivation d on a Banach algebra A such that the spectrum $\sigma([x, dx])$ is finite. Among the results are that, if A is semisimple, every such derivation must map into the socle of A and, if in addition these spectra consist of singletons only, then d must vanish.

MEI, Tao (tmei@math.tamu.edu) – Math. Dept, Texas A&M University

Non-commutative Lebesgue differentiation theorem and non-tangential limit of Poisson integrals

Abstract. We proved the non-commutative analogue of the classical Lebesgue differentiation theorem and non-tangential limit of Poisson integrals in non-commutative L^p-spaces. The essential tool we used is a non-commutative Hardy-Littlewood maximal inequality deduced from Junge's Doob's inequality for non-commutative martingales.

MINGO, James A. (mingo@mast.queensu.ca) – Queen's University, Kingston

Second order freeness and fluctuations of random matrices

Abstract. I will introduce the notion of second order freeness which extends the relation between random matrices and free probability from the level of expectations to the level of fluctuations; i.e. second order freeness captures the structure of fluctuations of random matrices in the same way as that freeness captures the structure of expectations of random matrices. This is joint work with Roland Speicher.

MUSAT, Magdalena (mmusat@math.ucsd.edu) – UCSD

Interpolation techniques and inequalities for non-commutative martingales

Abstract. We discuss interpolation properties of the non-commutative BMO space of martingales, introduced by Pisier and Xu, and prove that, as in the classical setting, it is a natural substitute for L_∞. We show that these techniques can then be applied to obtain a non-commutative

version of the John-Nirenberg theorem. Some of these results are joint work with Marius Junge.

NEAL, Matthew (nealm@denison.edu) – Denison University

Hilbertian contractively complimented operator spaces and the antisymmertic Fock space

Abstract. In this talk I will explain how all finite dimensional contractively complimented Hilbertian operator spaces are, modulo some degeneracy, completely isometric to certain spaces of annihilation and creation operators on the antisymmertric Fock space. I will then give results for the infinite dimensional case.

NGUYEN, Minh Chuong (nmchuong@math.ac.vn) – Institute of Mathematics, Vietnamese Academy of Science and Technology

Non-reflexitivity of Banach spaces and nonlinear set-valued mappings

Abstract. In recent years non-reflexitivity of Banach spaces and nonlinear set-valued mappings are studied by Nguyen Quynh Nga, Le Kim Thanh and me. With limited time, the talk deals only with nonlinear variational inequalities for semi-H-monotone and weakly semi-H-monotone set-valued mappings in non-reflexive Banach spaces.

NICOARA, Remus (rnicoara@ucla.edu) – University of California Los Angeles

A rigidity result for irrational rotation HT factors

Abstract. (Joint work with Sorin Popa and Roman Sasyk) We present a result on the *irrational rotation HT factors* $M_\alpha(\Gamma) = L_\alpha(\mathbb{Z}^2)\backslash\text{rtimes}\Gamma$, where Γ are arbitrary non-amenable subgroups of $SL(2,\mathbb{Z})$ and $\alpha = e^{2\pi it}$, $t \notin \mathbb{Q}$, showing that for each fixed Γ there exists no separable II_1 factor that contains $M_\alpha(\Gamma)$ for uncountably many α's. In particular, $\{M_\alpha(\Gamma)\}_\alpha$ are non-isomorphic modulo countable sets.

NIKOLAEV, Igor (nikolaev@math.ucalgary.ca) – Calgary

Classification of polycyclic dimension groups

Abstract. We classify polycyclic dimension groups, i.e. dimension groups with the underlying group Z^{2n} and $n > 1$. Our method is based on geometry of simple geodesic lines on the Riemann surface of genus n. We show that every polycyclic dimension group can be indexed by single real parameter t, where t is a positive irrational modulo the action of matrix group $GL(2, Z)$. This result is an extension of the Effros-Shen classification of dicyclic dimension groups and has various applications inside and outside C^*-algebra theory.

OIKHBERG, Timur (toikhber@math.uci.edu) – University of California, Irvine

A hereditarily indecomposable Hilbertian operator space with homogeneous finite dimensional subspaces

Abstract. We construct a Hilbertian operator space X and a homogeneous Hilbertian operator space E such that: (1) Every infinite dimensional subquotient of X fails the OAP, and is completely indecomposable. (2) E is completely finitely representable in any infinite dimensional subquotient of X.

OLAFSSON, Gestur (olafsson@math.lsu.edu) – Louisiana State University

Wavelet sets without groups

Abstract. This is a joint presentation with our student Mihaela Dobrescu. We will explain constructions of wavelet sets with respect to a "group like" set D of dilations acting in n-dimensional space. The corresponding wavelet will generate an orthonormal basis of a subspace of square integrable functions related to the action of a group of linear transformation.

OPĚLA, David (opela@math.wustl.edu) – Washington University in St. Louis

Generalizations of Andô's dilation theorem

Abstract. We show that any pair of contractions A_1, A_2 on a Hilbert space satisfying $(A_1A_2)^n = \lambda(A_2A_1)^n$ (with λ a complex unit) dilates to a pair of unitaries U_1, U_2 satisfying $(U_1U_2)^n = \lambda(U_2U_1)^n$. The case $n = 1, \lambda = 1$ is Andô's theorem. Also, for any k contractions $A_1, \ldots, A_k$ such that $A_{i_l}A_{j_l} = A_{j_l}A_{i_l}$, $1 \leq l \leq m$ there exist unitary dilations satisfying the same commutation relations, iff the graph on vertices $\{1, \ldots, k\}$ with edges $\{i_l, j_l\}_{l=1}^m$ does not contain a cycle. A special case is Parrot's example of three commuting contractions that do not have commuting dilations. We discuss some related theorems and examples.

PACKER, Judith (packer@euclid.colorado.edu) – University of Colorado

Filters and operators

Abstract. Quadrature mirror filters were first used many years ago by engineers in signal transmission, with low-pass and high-pass filters picking up different portions of the frequency bands of sound signals. In the late 1980's S. Mallat and Y. Meyer observed how filters could be useful in the construction of certain kinds of wavelets, and later I. Daubechies used their method of multiresolution analysis to great advantage in her famous construction of wavelets having desired properties. In the late 1990's, O. Bratteli and P. Jorgensen observed that any set of filters used in the above construction gave rise to a family of partial isometries that satisfied the Cuntz relations.

In this talk I will discuss filters and their connections to operators and operator algebras. Joint work with M. Rieffel will be discussed, in which filters can be used to describe isomorphisms between

certain finitely generated projective modules over $C(\mathbb{T}^n)$, and conversely, the theory of finitely generated projective modules over $C(\mathbb{T}^n)$ can be used to prove the existence of continuous high-pass filters related to a given continuous low-pass filter.

Turning to measurable filters, the generalized filters of L. Baggett, J. Courter, and K. Merrill will be discussed. I will talk about a method of constructing frames from some of these generalized filters; this method has a nice connection to operators satisfying a generalized form of the Cuntz relations. This last topic is based on recent joint work with Baggett, Jorgensen and Merrill.

PARCET, Javier (javier.parcet@uam.es) – University of Illinois at Urbana-Champaign

The L_p norm of homogeneous operator-valued polynomials in free generators

Abstract. Let $\mathbf{F}_n$ denote the free group with n generators $g_1, g_2, \ldots, g_n$. Let λ stand for the left regular representation of $\mathbf{F}_n$ and let τ be the standard trace associated to λ. Given any positive integer d, we study the operator space structure of the subspace $\mathcal{W}_p(n,d)$ of $L_p(\tau)$ generated by the family of operators $\lambda(g_{i_1} g_{i_2} \cdots g_{i_d})$ with $1 \le i_k \le n$. Our description of $\mathcal{W}_p(n,d)$ is given by a generalization of the non-commutative Khintchine inequality for free generators. The space $\mathcal{W}_\infty(n,d)$ was already studied by Buchholz. The main application is an interpolation theorem valid for any degree d and extending a previous result of G. Pisier for $d = 1$. Joint work with Gilles Pisier.

PATERSON, Alan (mmap@olemiss.edu) – University of Mississippi

The generalized Atiyah-Singer index theorem and groupoids

Abstract. (Work in progress) G. Kasparov has described an elegant index theorem which can be called the "generalized Atiyah-Singer index theorem" and from which the classical index theorem can be derived. In this lecture we will indicate how this generalized index theorem relates to the K-index theorem of Atiyah in his paper on the global theory of elliptic operators. Many of the index theorems of noncommutative geometry involve groupoid actions, and we will show how the generalized Atiyah-Singer index theorem can be extended to this context.

PETERSON, Jesse (jpete@math.ucla.edu) – UCLA

On the notion of relative property (T) for inclusions of von Neumann algebras

Abstract. We prove that the notion of *rigidity* (or *relative property* (T)) for inclusions of finite von Neumann algebras defined by S. Popa is equivalent to a weaker property, in which no "continuity constants" are required. The proof is by contradiction and uses infinite products of completely positive maps, regarded as correspondences.

PICIORIAGA, Gabriel (gpicioro@math.uiowa.edu) – University of Iowa

The von Neumann algebra of the canonical equivalence relation on the Thomson group

Abstract. We study the equivalence relation R generated by the (non-free) action of the Thomson group F on the unit interval. We show that this relation is a standard, quasipreserving ergodic equivalence relation. Using results of Feldman-Moore and Krieger we prove that the von Neumann algebra $M(R)$ associated to R is a type III factor. Further, we are able to compute its Connes invariant and show actually that $M(R)$ is a hyperfinite III_λ factor with $\lambda = 1/2$.
On the other hand we analyze R in connection with Gaboriau's work on costs of groups. By one of his results any non-amenable group of cost 1 must not admit treeable standard preserving equivalence relations (coming from a free action of the group); also cost > 1 implies non-amenability. It is the case that Thomson's group has cost 1, so that studying equivalence relations generated by F could be useful to attack the problem of (non)amenability of F. We prove that R above is treeable; of course we cannot apply Gaboriau's result (and conclude amenability for F) as it holds only for relations coming from free, preserving actions. However, we think the tree ability of R together with the hyperfiniteness of $M(R)$ bring a flavor of amenability on the Thomson group.

POPA, Sorin (popa@math.ucla.edu) – UCLA

Classification of factors arising from actions of classification of factors arising from actions of weakly rigid groups by Bernoulli shifts

Abstract. We study cross product II_1 factors $N \times_\sigma G$ arising formations σ of weakly rigid groups G (i.e., groups containing infinite normal subgroups with the relative property (T)) by Bernoulli shifts, on either the probability space or on the hyperfinite factor. We present several rigidity results for such factors, almost completely classifying them in terms of the group G and the "initial data" of the Bernoulli action σ.

POPESCU, Gelu (gpopescu@sphere.math.utsa.edu) – University of Texas - San Antonio

Entropy and multivariable interpolation

Abstract. We define a new notion of entropy for operators on Fock spaces and positive definite multi-Toeplitz kernels on free semigroups. This is studied in connection with factorization theorems for (multi-Toeplitz, multi-analytic, etc.) operators on Fock spaces. These results lead to entropy inequalities and entropy formulas for positive definite multi-Toeplitz kernels on free semigroups (resp. multi-Toeplitz operators) and consequences concerning the extreme points of the unit ball of the noncommutative analytic Toeplitz algebra F_n^∞.

We obtain several geometric characterizations of the multivariable central intertwining lifting, a maximum principle, and a permanence principle for the noncommutative commutant lifting theorem. Under certain natural conditions, we find explicit forms for the maximal entropy solution (and its entropy) for this multivariable commutant lifting theorem.

All these results are used to solve maximal entropy interpolation problems in several variables. We obtain explicit forms for the maximal entropy solution (as well as its entropy) of the Sarason, Carathéodory-Schur, and Nevanlinna-Pick type interpolation problems for the noncommutative

(resp. commutative) analytic Toeplitz algebra F_n^∞ (resp. W_n^∞). In particular, we provide explicit forms for the maximal entropy solutions of several interpolation (resp. optimization) problems on the unit ball of C^n.

QUIGG, John (quigg@math.asu.edu) – Arizona State University

k-graphs, coverings, and coactions

Abstract. k-graphs are k-dimensional generalizations of directed graphs, invented recently by Kumjian and the first author to help understand Robertson and Steger's higher-dimensional Cuntz-Krieger algebras constructed from buildings. As the theory of k-graphs has developed, the depth of analogy with directed graphs has been remarkable – it seems that almost every aspect of directed graphs has a valid and interesting analogue for the more general k-graphs. One of the most useful invariants of a directed graph is its fundamental groupoid, which classifies the coverings of the graph, and thereby gives a purely combinatorial approach to covering space theory.

We develop a theory of fundamental groupoids of k-graphs, and show that they classify k-graph coverings. We apply our classification of k-graph coverings to describe the C^*-algebras of covering k-graphs as crossed products by coactions of homogeneous spaces, generalizing recent results on the C^*-algebras of directed graphs.

RZESZOTNIK, Ziemowit (zioma@math.utexas.edu) – University of Texas

The norm of the Fourier transform on finite abelian groups.

Abstract. For $1 \leq p, q \leq \infty$ we calculate the norm of the Fourier transform from the L^p space of a finite abelian group to the L^q space of the dual group.

SASYK, Roman (rsasyk@math.ucla.edu) – UCLA

Cohomology of actions of groups by Bernoulli shifts (Joint work with S. Popa)

Abstract. We prove that if G is a countable, discrete group having infinite, normal subgroups with the relative property (T), then the Bernoulli shift action of G on $\Pi_{g\in G}(X_0, \mu_0)_g$ for (X_0, μ_0) an arbitrary probability space, has first cohomology group isomorphic to the character group of G.

SHLYAKHTENKO, Dima (shlyakht@math.ucla.edu) – UCLA

Free probability and L^2 Betti numbers

Abstract. We discuss a surprising connection between Voiculescu's free entropy dimension (a quantity he introduced in free probability theory) and L^2 Betti numbers.

SHULTZ, Fred (fshultz@wellesley.edu) – Wellesley College

Dimension groups for transitive interval maps

Abstract. A dimension triple is associated with each piecewise monotonic map of the unit interval. This dimension triple, viewed as a $Z[t, t^{-1}]$ module, comes equipped with a canonical finite sequence of generators. Any continuous, transitive, piecewise monotonic map is determined up to a binary choice by its dimension module with the associated sequence of generators. The dimension module by itself determines the topological entropy of any transitive piecewise monotonic map, and determines any transitive unimodal map up to conjugacy. The dimension group can be defined in terms of the dynamical system $\tau\colon\ I \to I$, and is also isomorphic to K_0 of a dynamically defined AI-algebra F_τ. (This AI-algebra and a related simple, purely infinite C^*-algebra O_τ have been studied further in joint work with Valentin Deaconu.)

SOLEL, Baruch (mabaruch@tx.technion.ac.il) – Technion

CP-semigroups and product systems

Abstract. Given a semigroup of normal, completely positive maps on a von Neumann algebra, we can associate with it a product system of W^*-correspondences and a certain representation of the product system. Conversely, given a product system and a representation of the system, we construct a semigroup of normal, completely positive maps. I will define the above mentioned concepts, describe these constructions and apply it to study subordinates of a given CP semigroup.This is a joint work with Paul Muhly.

SUDO, Takahiro (sudo@math.u-ryukyu.ac.jp) – University of the Ryukyus

K-theory of crossed products of C^*-algebras

Abstract. We study the K-theory of crossed products of C^*-algebras. It is shown that K-groups of crossed products by solvable Lie groups are isomorphic to those of tensor products with their group C^*-algebras. Also, we consider the equivariant K-theory for crossed products by $\mathbb{R}$.

TREIL, Sergei (treil@math.brown.edu) – Brown University

Singular integrals in robust control

Abstract. The talk is devoted to an old problem in Robust Control about the gap between the complex structured singular value μ and its upper bound $\overline{\mu}$. The problem concerns finite square matrices, and looks like an exercise from an advanced linear algebra course.

However, the problem turned out to be quite difficult. The only known solution requires an infinite-dimensional construction and some "hard" analysis.

In the talk, I am going to give the motivation for the problem, and explain main ideas of the solution. Some open problems (probably also extremely hard) will be presented.

No knowledge of Control Theory or of Singular Integral Operators is required: All necessary information will be presented.

VIOLA, Maria Grazia (viola@math.tamu.edu) – Texas A&M University

Non-outer conjugate actions on free product factors

Abstract. Connes proved in the '70s that any two actions on the hyperfinite II_1 factor, having the same outer period and obstruction to lifting, must be outer conjugate. A similar result does not hold for free group factors. In fact, we show the existence of two actions on any free product factor of the form $*_1^p Q$, with p prime and Q a II_1 factor, which have the same outer invariant, but are not outer conjugate.

WHITE, Stuart (s.a.white-1@ed.ac.uk) – University of Edinburgh

Tauer masas in the hyperfinite II_1 factor

Abstract. A Tauer masa is obtained by taking the direct limit of a chain of masas inside a chain of finite subfactors which generate the hyperfinite II_1 factor. We shall discuss properties of these masas, including their Pukánszky invariant and a characterization of singularity.

WOGEN, Warren (wrw@email.unc.edu) – University of North Carolina

Common cyclic vectors for normal operators

Abstract. In joint work with Bill Ross, we consider the following question: Which commuting families of cyclic normal operators have a common cyclic vector?

YEW, Khye Loong (khyeyew@math.uiuc.edu) – University of Illinois at Urbana Champaign

Notions of compact operators in operator space theory

Abstract. To be announced

YOON, Jasang (jyoon@iastate.edu) – Iowa State University

Contractive 2-variable weighted shifts with flat core

Abstract. Contractive 2-variable Weighted Shifts with Flat Core. In the joint work with R. Curto, we consider 2-variable weighted shifts $T_1(e_k) := \alpha_k e_{k+\varepsilon_1}, T_2(e_k) := \beta_k e_{k+\varepsilon_2}$ where α_k and β_k are positive weight double-indexed sequences, and $\varepsilon_1 = (1,0)$ and $\varepsilon_2 = (0,2)$. We assume that $\alpha_{k+\varepsilon_1} = \alpha_k$ and $\beta_{k+\varepsilon_2} = \beta_k$ for all $\mathbf{k} = (k_1, k_2) \geq (1,1)$. We characterize joint hyponormality and subnormality for all such weighted shifts. As a consequence, we describe a large collection of

non-subnormal jointly hyponormal commuting pairs of subnormal operators.

YOUSEFI, Hassan (hyousefi@math.unh.edu) – University of New Hampshire

Approximate reflexivity for Banach-space representations of C^*-algebras

Abstract. We prove new results in Don Hadwin's "General View of Reflexivity" and apply them to representations of C^*-algebras on Banach spaces. We also obtain some purely algebraic results.

ZSIDO, Laszlo (zsido@mat.uniroma2.it) – University of Rome "Tor Vergata"

A perturbation problem in the Tomita–Takesaki Theory

Abstract. Abstract: Let $M \subset B(H)$ be a von Neumann algebra, in standard form with respect to some normal semi-finite faithful weight φ, and $N \subset M$ a standard von Neumann subalgebra. Then the respective modular operators Δ_M and Δ_N satisfy $\Delta_M \leq \Delta_N$, so by operator monotonicity we have $\log \Delta_M \leq \log \Delta_N$ on a dense common domain. H.-W. Wiesbrock discovered that, for bounded φ, the positive operator $\log \Delta_N - \log \Delta_M$ is essentially selfadjoint whenever N is left invariant by $\mathrm{Ad}\,\Delta_M^{it}$ for $t \leq 0$ (or for $t \geq 0$), but his proof contains a gap. In joint work with H. Araki, we have obtained a complete proof for the above result, called the Half-sided Modular Inclusion Theorem, in full generality. This proof will be discussed in the talk.
