WABASH
EXTRAMURAL MODERN ANALYSIS
MINICONFERENCE

October 2 and 3, 2010

Abstracts

Invited Talks

9:30–10:20, Saturday, Room: 252

Operator Monotone functions of several variables

John McCarthy, *Washington University*

In 1934 K. Lowner characterized functions that preserve operator ordering, i.e. real-valued functions f with the property that if A and B are self-adjoint matrices and $A \leq B$, then $f(A) \leq f(B)$.

We will discuss what functions of two variables g have the property that if (A_1, A_2) is a pair of commuting self-adjoints, (B_1, B_2) is another, and $A_1 \leq B_1$ and $A_2 \leq B_2$, then $g(A_1, A_2) \leq g(B_1, B_2)$.

This talk is based on joint work with Jim Agler and Nicholas Young. .

10:30–11:20, Saturday, Room: 252

Entropy and the variational principle for actions of sofic groups

David Kerr, *Texas AM University*

Recently Lewis Bowen introduced a notion of entropy for measure-preserving actions of a countable sofic group on a standard probability space admitting a generating partition with finite entropy. Using an operator algebra perspective we develop a more general approach to sofic entropy which produces both measure and topological dynamical invariants. We establish the variational principle in this context and use it to compute the topological entropy of certain algebraic actions of residually finite groups in terms of the Fuglede-Kadison determinant. This is joint work with Hanfeng Li.

2:00–2:50, Saturday, Room: 252

Tensor Products of Operator Systems and the Kirchberg Conjecture

Vern Paulsen, *University of Houston*

This talk is based on joint work with K.H. Hoon, A. Kavruk, I.Todorov and M. Tomforde. We have begun a systematic study of tensor products of operator systems that somewhat parallels the tensor theory of operator spaces. We have identified some important tensor products and begun to study the operator systems that preserve various pairs of tensor products. This theory can be thought of as a refinement of classical nuclearity. We prove that Kirchberg's conjecture(which is equivalent to the Connes' Embedding conjecture) is equivalent to the assertion that every (min,er)-nuclear operator system is also (el,c)-nuclear.

3:05–3:55, Saturday, Room 252

Macroscopic dimension and essential manifolds

Alexander Dranishnikov, *University of Florida*

To learn about a space study its universal cover. This slogan was widely applied by Gromov in particular to studying manifolds of positive scalar curvature (PSC). One of the tools suggested by him is the macroscopic dimension dim_{mc}. He conjectured that for n-manifold M with PSC the macroscopic dimension of its universal cover $\tilde{M}$ is at most $n-2$. Thus, the question for which n-manifolds the equality $dim_{mc}\tilde{M} = n$ holds true is of great importance. By the definition of macroscopic dimension the equality $dim_{mc}\tilde{M} = n$ is a form of essentiality of M expressed in terms of $\tilde{M}$. We recall that a manifold M is essential if the image of the fundamental class is nontrivial, $f_*([M]) \neq 0$, for a map $f : M \to B\pi$ classifying the universal cover of M. Gromov conjectured that for all rationally essential n-manifolds there is the equality $dim_{mc}\tilde{M} = n$. We will discuss a recent progress on both Gromov's conjectures.

9:00–9:50, Sunday, Room: 252

The Feichtinger conjecture for group representation frames

Deguang Han, *University of Central Florida*

The Feichtinger frame conjecture states that every bounded (from below) frame is a finite union of basic Riesz sequences. This conjecture turns out to be equivalent to the Kadison-Singer pure state extension problem and several other well-known unsettled problems. In this talk I will focus on a few aspects of this conjecture related to group representation frames and exponential frames for fractal measures. Additionally I will also briefly discuss its connection with a new duality principle for group representations and the II_1 factor classification problem .

10:00–10:50, Sunday, Room 252

Subgroup distortion and bounded cohomology

Indira Chatterji, *University State University*

For a connected Lie group G, we show in a joint work with Mislin, Pittet and Saloff-Coste that the following three conditions are equivalent: 1. The fundamental group of G embeds quasi-isometrically in the universal cover of G. 2. All Borel (i.e. measurable) cohomology classes of G with integer coefficients are bounded. 3. The radical of G is linear.

In this talk I will give some motivations for this result, introduce all the objects used in the statement and explain on an example some ideas used in the proof.

11:00–11:50, Sunday, Room: 252

Von Neumann algebras with unique group measure space Cartan subalgebra

Ionut Chifan, *Vanderbilt University*

In this talk I will introduce a class of groups $\mathcal{CR}$ satisfying the following property:

Any free, ergodic, measure preserving action on a probability space of *any* group $\Gamma \in \mathcal{CR}$ gives rise to a von Neumann algebras with unique group measure space Cartan subalgebra.

I will also discuss some applications of this result to W^*-superrigidity. This is joint work with Jesse Peterson.

Contributed Talks

11:35–12:00, Saturday, Room: 252

Automatic continuity of orthogonality preserving linear maps

Timur Oikhbeg, *University of California at Irvine*

Several known results assert that an orthogonality (resp. disjointness) preserving bijection between C*-algebras (function spaces) must be continuous. In this work, we establish the automatic continuity of bijections from a C*-algebra to a Banach space, provided the images of orthogonal elements satisfy a certain geometric orthogonality condition. Related results for vector-valued spaces of continuous functions are also obtained. This is joint work with A. M. Peralta and M. Ramirez.

11:35–12:00, Saturday, Room: 274

Criteria for irregularity

Gabriel Prajitura, *SUNY-Brockport*

We will discuss sufficient conditions for the existence of irregular vectors for Banach space operators.

4:10–4:35, Saturday, Room: 252

On the classification problem for a class of crossed product C^*-algebras

José Carrión, *University*

A (discrete) residually finite group G acts on a profinite completion $\tilde{G}$ by left translation—a basic example is the action of $\mathbb{Z}$ on the p-adic integers $\mathbb{Z}_p$. We study the classification of the corresponding crossed product C^*-algebra $C(\tilde{G}) \rtimes G$ via K-theoretical invariants.

The eponymous C^*-algebras studied by Bunce and Deddens in the 1970s may be regarded as the case $G = \mathbb{Z}$ and, in analogy with this case, the so-called generalized Bunce-Deddens algebra $C(\tilde{G}) \rtimes G$ was shown by Orfanos to be simple, separable and nuclear, and to have real rank zero and stable rank one. We show that for a large class of groups (which includes the discrete Heisenberg group, for example) the corresponding generalized Bunce-Deddens algebra is classified by its Elliott invariant.

4:10–4:35, Saturday, Room: 274

Carleson measures, Riemann-Stieltjes and multiplication operators on $F(p, q, s)$ spaces

Ruhan Zhao, *SUNY-Brockport*

Let T be a nonnegative Borel measure on the unit disk of complex plane. We characterize those measures T such that the general family of spaces of analytic functions, $F(p, q, s)$, which contains many classical function spaces, including the Bloch space, BMOA and the Q_s spaces, are embedded boundedly or compactly into a tent-type spaces. The results are applied to characterize boundedness and compactness of Riemann-Stieltjes operators and multiplication operators on $F(p, q, s)$.

4:45–5:10, Saturday, Room: 252

Nontrivially Noetherian and Artinian C*-algebras

Taylor Hines, *Purdue University*

We say that a C*-algebra is Noetherian if it satisfies the ascending chain condition for two-sided closed ideals. A nontrivially Noetherian C*-algebra is one with infinitely many ideals. Here, we show that many nontrivially Noetherian C*-algebras exist, and that a separable C*-algebra is Noetherian if and only if it contains countably many ideals and has no infinite strictly ascending chain of primitive ideals. Furthermore, we prove that every Noetherian C*-algebra has a finite-dimensional center. Where possible, we extend results about the ideal structure of C*-algebras to Artinian C*-algebras (those satisfying the descending chain condition for closed ideals).

4:45–5:10, Saturday, Room: 274

Dirac operators on the quantum punctured disk

Matt McBride, *IUPUI*

I study quantum analogs of the Dirac type operator $-2\overline{z}\frac{\partial}{\partial\overline{z}}$ on the punctured disk, subject to the Atiyah-Patodi-Singer boundary conditions. I construct a parametrix of the quantum operator and show that it is bounded outside of the zero mode. annulus.

5:20–5:45, Saturday, Room: 252

"Good" semigroups and their applications to fourier multipliers

University of Illinois at Urbana-Champaign

We shall define what it means for a semigroup of completely positive, self-adjoint operators on a von Neumann algebra to be "good" in the sense of Varopoulos. Using a factorization trick of Marius Junge, we shall show that certain semigroups on group von Neumann algebras are "good." Finally, we shall discuss some consequences of this fact to boundedness of fourier multipliers on noncommutative L_p spaces. This is joint work with Marius Junge and Tao Mei.