WABASH
EXTRAMURAL MODERN ANALYSIS
MINICONFERENCE

September 28 and 29, 2013

Program and Abstracts

Times given are Eastern Daylight Time

Talks and Registration will be in the Informatics and Communications Technology Complex at IUPUI. The talks will take place in Room 252.

SATURDAY:

9:10 Registration, Refreshments

9:50–10:40 *DAVID SHERMAN, University of Virginia*
Equivalent operator categories

10:50–11:40 *NOAH SNYDER,Indiana University*
The Brauer-Picard groupoid of the Asaeda-Haagerup subfactor

11:50–12:10 *MICHAEL BRANNAN, University of Illinois at Champaign Urbana*
L_p-representations of discrete quantum groups

LUNCH: 12:30 at Delhi Palace (located at the food court at 10th Street and Indiana Street and University

2:00–2:50 *ANDREW TOMS, Purdue University*
Mean dimension and the structure of crossed products

3:00–3:50 *ROLAND VERGNIOUX, University of Normandy*
On the adjoint representation of orthogonal free quantum groups

4:00–4:20 *BOGDAN UDREA, University of Illinois at Champaign Urbana*
Inner amenability for groups and central sequences in factors

4:30–4:50 *TIMUR OIKHBERG, University of Illinois at Champaign Urbana*
Subprojectivity of Banach spaces

5:00–5:20 *BEN WALLIS, Northern Illinois University*
The almost-invariant halfspace problem

SUNDAY:

9:00	Refreshments
9:30–10:20	*BOBBY RAMSEY, Ohio State University* Exact families of maps and embedding relative property A groups
10:30–11:20	*MATTHEW KENNEDY, Carleton University* The Choquet boundary of an operator system
11:30–12:20	*ZHIZHANG XIE, Texas A&M University* Higher rho invariants and the moduli space of positive scalar curvature metrics

ABSTRACTS

David Sherman *Equivalent operator categories*

Abstract: Leaving rigorous definitions to the talk, operator categories are natural classes that include C*-algebras, operator systems, hereditary manifolds, operator algebras, Jordan operator algebras, etc. I will show how to associate the following features to any such category: an operator topology, a representation theory, and a convexity/dilation theory. It turns out that if one of these features agrees for a pair of categories, then all three do, in which case the categories are called equivalent. I will discuss some (all?) equivalences, along the way obtaining new observations about Arveson's hyperrigidity and maybe even triangles.

Noah Snyder *The Brauer-Picard groupoid of the Asaeda-Haagerup subfactor*

Abstract: The classification of small index subfactors yielded several new subfactors, which are now beginning to be understood. The Asaeda-Haagerup small index subfactor gives a Morita equivalence between two fusion categories. We determine all fusion categories in this Morita equivalence class (there are exactly 6) and all Morita equivalences between them. In particular, we give a new "symmetric" construction of the Asaeda-Haagerup subfactor. This construction allows for new computations (for example, of the Drinfel'd center of the Asaeda-Haagerup fusion categories) and suggests that Asaeda-Haagerup might live in an infinite family.

Michael Brannan *L_p-representations of discrete quantum groups*

Abstract: In this talk, I will discuss some recent joint work with Zhong-Jin Ruan, where we investigate the structure of L_p-representations of unimodular discrete quantum groups. Roughly speaking, these are unitary representations with the property that there exists an orthonormal basis of the Hilbert space such that the corresponding matrix coefficients of the representation live in the non-commutative L_p-space associated to the Haar weight. For certain examples of free quantum groups, we characterize (for all $p \in [1, \infty]$) the positive definite functions associated to L_p-representations. As an application of this characterization, we show that the Hopf-$*$-algebra of polynomial functions over a free orthogonal quantum group admits uncountably many pairwise non-isomorphic "exotic" completions as a quantum group C*-algebra.

Andrew Toms *Mean dimension and the structure of crossed products*

Abstract: Mean dimension, due to Gromov and Lindenstrauss-Weiss, is a theory of dimension suitable for analyzing infinite entropy dynamical systems. Giol and Kerr noticed a connection between the mean dimension of a dynamical system and an invariant of its C*-algebra crossed product, the radius of comparison. In this talk we describe a conjecture connecting these two quantities and progress toward its solution. This is joint work with Taylor Hines and Chris Phillips.

Roland Vergnioux *On the adjoint representation of orthogonal free quantum groups*

Abstract: The free orthogonal quantum groups have been introduced by Wang as "liberations" of the usual orthogonal groups. From the probabilistic and analytical point of view, their discrete duals are matricial analogues of the usual free groups. I will review some of their operator-algebraic properties and present a new result about the adjoint representation of orthogonal free quantum groups, with application to strong solidity. This is joint work with Pierre Fima.

Bogdan Udrea *Inner amenability for groups and central sequences in factors*

Abstract We show that a large class of i.c.c., countable, discrete groups satisfying a weak negative curvature condition are not inner amenable. By recent work of Hull and Osin, our result recovers that mapping class groups and $\mathrm{Out}(\mathbb{F}_n)$ are not inner amenable. We also show that the group-measure space constructions associated to free, strongly ergodic p.m.p. actions of such groups do not have property Gamma of Murray and von Neumann. This is joint work with Ionut Chifan and Thomas Sinclair.

Oikhberg, Timur *Subprojectivity of Banach spaces*

Abstract An infinite dimensional Banach space X is said to be subprojective if every subspace $Y \subset X$ contains a subspaces Z, complemented in X (all subspaces are assumed to be infinite dimensional and closed). This notion was introduced in the mid-1960's by R.Whitley, who was interested in describing strictly singular and cosingular operators. Examples of subprojective spaces include ℓ_p $(1 \leq p < \infty)$. $L_p(0,1)$ is subprojective iff $2 \leq p < \infty$.

We undertake a systematic study of subprojectivity. Here are the sample results: (1) The space $B(X)$ is never subprojective. (2) Suppose K is a compact metrizable space, and X is a Banach space. Then $C(K,X)$ is subprojective iff K is countable, and X is subprojective. (3) If E is a subprojective symmetric sequence space not containing c_0, then the Schattenn space S_E is subprojective. This is joint work with E.Spinu.

Ben Wallis *The almost-invariant halfspace problem*

Abstract In this talk we will present recent results demonstrating how existence of an AIHS is related to some properties of the parts of the spectra of T and T^*.

Bobby Ramsey *Exact families of maps and embedding relative property A groups*

Abstract Relative property A is a generalization of Yu's property A defined for countable discrete groups. We will discuss how to adapt this to metric spaces by considering families of set maps. Using this characterization, we will show that if the peripheral subgroups are coarsely embeddable into Hilbert space, then so is the group.

Matthew Kennedy *The Choquet boundary of an operator system*

Abstract In this talk, I will discuss the recent solution (with Ken Davidson) of Arveson's conjecture on the existence of the noncommutative Choquet boundary of an operator system. This is an intrinsic invariant of an operator system that plays a fundamental role in Arveson's approach to the study of non-commutative dilation theory and non-self-adjoint operator algebras. I will also mention some recent work (with Orr Shalit) connecting these ideas to the problem of the essential normality of a commuting tuple of operators.

Zhizhang Xie *Higher rho invariants and the moduli space of positive scalar curvature metrics*

Given a closed spin manifold M which carries a positive scalar curvature metric, one can associate an abelian group $P(M)$ to the space of all positive scalar curvature metrics on this manifold. The group of all diffeomorphisms of the manifold naturally acts on $P(M)$. The moduli group of positive scalar curvature metrics is defined to be the quotient abelian group of this action, i.e. the coinvariant of this action. We use the higher rho invariant and the finite part of the K-theory of the group C^*-algebra of $\pi_1(M)$ to give a lower estimate of the rank of the moduli group. This is joint work with Guoliang Yu.