XXI CLA - Session S04
Operator Algebras

S04 - July 25, 15:00 – 15:50

Invariants of Operator Systems

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Operator systems are unital, selfadjoint, subspaces of $B(H)$. They form a category with unital completely positive maps as their morphisms. The problem of classifying these structures is very hard, even in the finite-dimensional case; in fact, there is still no classification in the 3-dimensional case! We will show some positive classification results, both of an abstract and a concrete flavour.

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Free path groupoid grading on Leavitt path algebras

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In this talk we realize the Leavitt path algebra associated to a graph as a partial skew groupoid ring. We then use this grading to characterize free path groupoid graded isomorphisms (that preserve generators) between Leavitt path algebras.

S04 - July 25, 17:30 – 18:10

Globalizations of partial actions and Imprimitivity Theorems

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The final goal of this talk is to show how some of the well known imprimitivity theorems (as Raeburn's Symmetric Imprimitivity Theorem) can be extended to partial actions. To that end we define proper partial actions following Buss-Echterhoff and Meyer's definitions of proper actions on C*-algebras. After that we construct, starting from a "proper" partial action α of G on A, a fixed point algebra $\mathcal{F}^\alpha(A)$ and a $\mathcal{F}^\alpha(A) - A \rtimes_\alpha G$ equivalence bimodule X_α.

Under suitable assumptions, given a C*-partial action β of H on A commuting with α, there exists a unique partial action $\widetilde{\beta}$ of H on $\mathcal{F}^\alpha(A)$ cannonically induced by β. Using F. Abadie's notion of Morita equivalence of partial actions (as done by Curto, Muhly and Williams for global actions) we show $\mathcal{F}^\alpha(A) \rtimes_{\widehat{\beta}} H$ is Morita equivalent to $\mathcal{F}^\beta(A) \rtimes_{\widehat{\alpha}} G$.

In the seccond part of the talk we relate our imprimitivity theorems for partial actions to the problem of constructing a globalization for a given partial action on C*-algebra (or a Hilbert module). We present a

necessary and sufficient condition for the existence of globalizations and, finally, we use it to investigate to what extent our imprimitivity theorems can be obtained by using Buss-Echterhoff's theorems and globalizations of partial actions.

Joint work with Fernando Abadie (Advisor, Universidad de la República, Uruguay) and Alcides Buss (Advisor, Universidade Federal de Santa Catarina, Brasil)..

S04 - July 25, 18:15 – 18:55

On the simplicity and K-theory of the L^p operator algebras $\mathcal{O}^p(Q)$

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For $p \in [1, \infty)$ and a row finite graph Q, we define a class of representations ρ of the Leavitt algebra $L(Q)$ on spaces of the form $L^p(X, \mu)$, which we call the spatial representations. We prove that for fixed p and Q such that $L(Q)$ is simple and purely infinite, the L^p operator algebra $\mathcal{O}^p(Q) = \overline{\rho(L(Q))}$ is the same for the all spatial representations ρ. When the graph Q is the rose with d petals, we recover the results given by C. Phillips in 2012, in particular for $p = 2$ the Cuntz algebra $\mathcal{O}_d$ appears.

We give conditions for the simplicity of $\mathcal{O}^p(Q)$ as L^p operator algebra and we calculate its K-theory.

Joint work with Guillermo Cortiñas (Universidad de Buenos Aires, Argentina).

S04 - July 26, 15:00 – 15:50

Nonarchimedean bornological algebras and their cyclic homology

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Let V be a complete discrete valuation domain with maximal ideal πV, fraction field $K = V[\pi^{-1}]$, and residue field $k = V/\pi V$. We are interested in developing a bivariant cohomology theory for k-algebras which takes values in K-vector spaces and has all the good properties (homotopy invariance, Morita invariance, excision, agreement with the relevant variant of de Rham cohomology in the commutative case, etc.). We assume that K has characteristic zero, but make no assumption on the characteristic of k; in fact the main case for us is $\mathrm{char}(k) = p > 0$. The general idea is to associate to each k-algebra A a (pro-) K-algebra $T(A)$ and take (some variant of) the periodic cyclic homology of $T(A)$. Such a construction already exists for commutative k-algebras of finite type; it yields Bertherlot's rigid cohomology, which is the correct variant of de Rham cohomology in this setting. In this talk I will explain a result we have interpreting rigid cohomology (made 2-periodic) of a commutative k-algebra A of finite type as the periodic cyclic homology of a certain pro-complete bornological K-algebra $T(A)$. Along the way I will discuss bornological V and K-algebras,

Joint work with Joachim Cuntz (Universität Münster) and Ralf Meyer (Universität Göttingen).

S04 - July 26, 16:00 – 16:50

Groupoid fibrations and their C*-algebras

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Fibrations of groupoids describe actions of groupoids on other groupoids by equivalences. A fibration from a topological groupoid L to another topological groupoid H is a functor $F\colon L \to H$ with some properties. The kernel of this functor is another topological groupoid G, called the fibre of F. We interpret L as a transformation groupoid "$G \rtimes H$" for an action of H on G by (partial) equivalences. Classical actions by automorphisms and groupoid extensions are particular cases of fibrations. Several properties, as for instance, (local) Hausdorffness or compactness and amenability are preserved by groupoid fibrations in the sense that L has the property if G and H have it.

Our main result shows that a crossed product by L can be written as an iterated crossed product, first by G and then by H, that is, $A \rtimes L \cong (A \rtimes G) \rtimes H$.

Joint work with Ralf Meyer (University of Göttingen, Germany).

S04 - July 26, 17:30 – 18:20

Applications of ternary rings to C^*-algebras

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Given a *-algebra, it is often possible to endow it with different C*-norms, thus giving rise to different C*-algebras after completion. This situation arises, for example, when dealing with any sort of crossed products. On the other hand, an important tool in the theory of operator algebras is the so called Morita-Rieffel equivalence of C*-algebras. In our talk we will exhibit pairs of *-algebras such that any C*-norm on one of them induces a C*-norm on the other one, in such a way that the corresponding completions are Morita-Rieffel equivalent. Applications will be given to tensor products of C^*-algebras and to cross-sectional algebras of Fell bundles over groups.

Joint work with Damián Ferraro (Universidad de la República, Uruguay).
