Contributed Talks

Monday

Cockins Hall 312

Speaker: Roberto Hernandez Palomares

Title: Discrete inclusions of C*-algebras

Abstract: A discrete inclusion of C*-algebras generalizes the usual crossed product C*-algebra by an action of a discrete group. More generally, we view a C*-discrete inclusion as a generalized crossed product C*-algebra by a quantum dynamics governed by a unitary tensor category. In fact each subfactor yields C*-inclusions by looking at its standard invariant, and as such we obtain families of examples from discrete quantum groups. In this talk, we will introduce the C*-algebraic and tensor categorical structures underlying these inclusions and will describe a Galois correspondence for intermediate C*-discrete subalgebras in terms of algebraic data.

Speaker: Jennifer Pi

Title: Uniformly Super McDuff II_1 Factors

Abstract: The notion of asymptotic center (or nontrivial central sequences) has been incredibly useful for distinguishing II_1 factors. As such, there are many named concepts describing the asymptotic center, including the super McDuff property, which says that a II_1 factor M has II_1 factorial relative commutant in an ultrapower. In this talk, we introduce an (ultrapower-free) uniform version of the super McDuff property. We show the uniform super McDuff property is preserved under elementary equivalence and in some sense generic among II_1 factors. This is joint work with Isaac Goldbring, David Jekel, and Srivatsav Kunnawalkam-Elayavalli.

Speaker: Sayan Das

Title: Strong Approximate Transitivity

Abstract: The notion of Strong Approximate Transitivity (SAT) for group actions on probability measure spaces was introduced by Jaworski in the early 90's. A canonical example of an SAT group action is provided by a group acting on its Poisson boundary (with respect to some "nice" probability measure on the group). In this talk, I will discuss a noncommutative analogue of the SAT property, and its connection with noncommutative Poisson boundary inclusions.

Speaker: Lucas Hall

Title: A Covariant Stone-von Neumann Theorem for Locally Compact Quantum Groups

Abstract: After a brief review of the (more or less) classical Stone von Neumann Theorem, we explore recent developments concerning dynamical representations on Hilbert modules which directly generalize the Hilbert space setting. In particular, we classify C*-

correspondences over Elementary C*-algebras and provide applications to the study of coactions of a locally compact quantum group over an elementary C*-algebra.

Cockins Hall 228

Speaker: Gabriel A. Coloma Irizarry

Title: Resurgence Algebras & micro-differential operators

Abstract: Using the formalism of pseudo-differential operators, it is possible to understand Ecalle's general resummation theory. We present the special case at an isolated singularity where the associated local subalgebra of resurgent germs have full formal integrals with respect to certain micro-differential operators.

Speaker: Scott Zimmerman

Title: Singular integrals on regular, smooth curves in Carnot groups and Banach duals

Abstract: The modern study of singular integral operators on curves in the plane began in the 1970's. Since then, there has been a large volume of work done regarding the boundedness of singular integral operators defined on lower dimensional sets in Euclidean spaces. In recent years, mathematicians have attempted to push these results into a more general metric setting. In this talk, I will discuss some recent progress with V. Chousionis and S. Li regarding SIOs along $C^{1,\alpha}$ curves in Carnot groups and a similar result for curves in the dual of any separable Banach space.

Speaker: Zhen-Chuan Liu

Title: L^p decompostion of the free group von Neumann algebras

Abstract: Let $\mathbb{F}_n$ be the non-abelian group of n free generators. We will introduce a concrete operator-space isomorphism between the noncommutative-L^p spaces associated with the group von Neumann algebras associated with $\mathbb{F}_n$ for $n = 2, \infty$. We will further discuss the L^p-unconditional decompositions of the group von Neumann algebras associated with $\mathbb{F}_2$ and the possible connection to Murray/von Neumann's the free group factor problem. This talk is based on joint work with Tao Mei and Sheng Yin.

Speaker: Chian Yeong Chuah

Title: Characterization of Positive Definite, Radial Functions on Free Groups

Abstract: In this talk, we will give a brief account about the relationship between radial positive-definite functions on free groups and the moments of probability measures on the interval $[-1, 1]$. The case for the commutative setting is proven by Bochner. Meanwhile, Haagerup and Knudby proved the case for ℓ^1 radial positive definite function. We explore the case for ℓ^2 radial positive definite functions (completely positive Fourier multipliers) on free groups.

Cockins Hall 232

Speaker: Mariusz Tobolski

Title: Noncommutative numerable principal bundles from group actions on C*-algebras

Abstract: The notion of a compact noncommutative (or quantum) principal bundle, which generalizes the Cartan compact principal bundle from topology (local triviality not assumed), emerged in the literature almost 30 years ago. Recently, the difficulty of introducing the local-triviality condition to the noncommutative realm was overcome using the notion of the local-triviality dimension of an action of a compact quantum group on a unital C*-algebra. In this talk, I will propose a definition of a locally trivial noncommutative principal bundle in the setting of actions of locally compact Hausdorff groups on (possibly non-unital) C*-algebras. I will discuss various motivations and technical difficulties that appear in the non-compact case. I will also provide some basic results and examples. The key difference is that, although the problem itself can be described in the language of C*-algebra, one is quickly led beyond the Gelfand-Naimark duality and to the theory of multipliers of the Pedersen ideal.

Speaker: Jack Spielberg

Title: Still life with C^*-bundle

Abstract: The Effros-Shen algebras are simple AF algebras associated to irrational numbers via Bratteli diagrams constructed from continued fraction expansions. Aguilar and Latrémolière showed that these form a continuous field over the (Polish) space of irrational numbers. In the case of a rational number the construction of Effros and Shen assigns two finite dimensional C^*-algebras. In order to extend the continuous field to rational numbers it is necessary to cut the reals at the rational points, giving a Cantor set as base. Recent work of Mitscher and Mitscher-S gives an alternate construction of the Effros-Shen algebras from certain categories of paths. This construction assigns a unique (infinite dimensional) C^*-algebra to a rational number. We show that these form a continuous field over the open unit interval. The C^*-algebras corresponding to rational numbers are certain extensions of the matrix algebras over $C(\mathbb{T})$ by $\mathcal{K} \oplus \mathcal{K}$. (This is a report on work in progress, joint with Ian Mitscher.)

Speaker: Samantha Brooker

Title: Spectral triples on a non-standard presentation of Effros-Shen AF algebras

Abstract: The Effros-Shen algebra corresponding to an irrational number θ can be described by an inductive sequence of finite-dimensional subalgebras, where the connecting maps encode the terms of the continued fraction expansion of θ. In recent work, Mitscher and Spielberg present the Effros-Shen algebra as the C^*-algebra of a category of paths determined by the continued fraction expansion of θ. With this approach, the algebra is realized as the inductive limit of a sequence of infinite-dimensional, rather than finite-dimensional, subalgebras. Drawing on a construction by Christensen and Ivan, we use this inductive limit structure to define a spectral triple. This is joint work with Konrad Aguilar and Jack Spielberg.

Speaker: Jonathan Brown

Title: Intermediate subalgebras of quasi-Cartan pairs

Abstract: There is a long tradition of ring theory informing operator algebras and vice versa. A recent pertinent example is the development in ring theory by Armstrong et al. of quasi-Cartan pairs that is an inclusion of an abelian algebra B inside a larger algebra A. Their study mimics Renault's theory of C*-algebraic Cartan pairs: in particular they show that every quasi-Cartan pair over a field arrises as a groupoid ring (dubbed a twisted Steinberg Algebra). In work with L. Clark and A. Fuller, we study when subalgebra C with $B \subseteq C \subseteq A$ with $B \subseteq A$ quasi-Cartan also has $B \subseteq C$ quasi-Cartan. Much like the C*-case studied by Brown et al, we show that $B \subseteq C$ is quasi-Cartan if and only if C corresponds to an open subgroupoid of the groupoid associated to the original pair. Moreover, we show that every intermediate subalgebra of a quasi-Cartan pair (B, A) gives a quasi-Cartan pair if and only if the groupoid associated to the pair (B, A) satisfies an extremely constrictive condition on isotropy. Inspired by this result we then show the same theorem holds in the C*-case, this generalizes the theorem of Brown et al which shows that every intermediate subalgeba of a nuclear Diagonal pair is also Diagonal.

EA 160 (Final talk)

Speaker: Kaifeng Bu

Title: Quantum Gaussians and Central Limit Theorem

Abstract: Stabilizer states plays an important role in quantum computation, such as quantum error correcting code and measurement-based quantum computation. In this talk, I will introduce a new quantum convolution and a conceptual framework to study states in discrete-variable (DV) quantum systems. Moreover, we establish a quantum central limit theorem, based on iterating the convolution of a quantum state, and show this converges to a stabilizer state, where we suggest the name "Quantum Gaussians " for stabilizer states. This talk is based on the joint work with Weichen Gu, and Arthur Jaffe (arXiv:2302.07841, 2302.08423).

Tuesday

Cockins Hall 218

Speaker: Melody Molander

Title: Skein Theory for Index 4 Subfactor Planar Algebras

Abstract: Subfactor planar algebras first were constructed by Vaughan Jones as an axiomatization of the standard invariant of a subfactor. Planar algebras can be conveniently encoded by diagrams in the plane and satisfy some skein relations. These planar algebras also encode two other invariants of the subfactors: the index and the principal graph. The Kuperberg Program asks to find all diagrammatic presentations of subfactor planar algebras. This program has been completed for index less than 4. In this talk, I will introduce subfactor planar algebras and give presentations for subfactor planar algebras of index 4.

Speaker: Daniel Wallick

Title: An algebraic quantum field theoretic approach to toric code with gapped boundary

Abstract: Topologically ordered quantum spin systems have become an area of great interest, as they may provide a fault-tolerant means of quantum computation. One of the simplest examples of such a spin system is Kitaev's toric code. Naaijkens made mathematically rigorous the treatment of toric code on an infinite planar lattice (the thermodynamic limit), using an operator algebraic approach via algebraic quantum field theory. We adapt his methods to study the case of toric code with gapped boundary. In particular, we recover the condensation results described in Kitaev and Kong and show that the boundary theory is a module tensor category over the bulk, as expected.

Speaker: Kyle Kawagoe

Title: Enriched string-net models and their excitations

Abstract: One of the central goals of the theoretical study of topological phases of matter is to construct quantum mechanical models which realize the categorical classification of these phases. A foundational work by Levin and Wen (2005) introduced the so-called string net models in 2+1 dimensions. These models of topological phases of matter made a concrete connection between the Drinfeld center $Z(\mathcal{X})$ of a fusion category $\mathcal{X}$ with the structure of the model's anyons, the local excitations which are a hallmark of such phases. Walker and Wang (2012) later developed a similar class of models in 3+1 dimensions which also give rise to topological phases of matter, this time from unitary modular fusion categories (UMTCs).

A recent paper by Huston, Burnell, Jones, and Penneys (2022) proposed a scheme for modeling the boundary of a Walker-Wang model generated by the UMTC $\mathcal{A}$ as an $\mathcal{A}$ enriched fusion category $\mathcal{X}$. This paper suggested that the Müger centralizer $Z^{\mathcal{A}}(X)$ of $\mathcal{A}$ in $Z(\mathcal{X})$ describes the local excitations in their theory. In this talk, we confirm this claim by relating the excitations of their model to irreducible representations of a structure we call the "dome algebra." This algebra is closely related to Ocneanu's tube algebra. Furthermore, we will present this material from a unitary tensor category viewpoint, and will be able to avoid the standard skeletal point of view which deals with $6j$ symbols.

Speaker: Giovanni Ferrer

Title: Operator algebraic tricategories

Abstract: An operator algebraic tricategory is a higher categorical analogue of an operator algebra. For algebraic tricategories, Gordon, Power, and Street proved that every algebraic tricategory is equivalent to a Gray-category, the strictest model of a weak 3-category. We adapt this result to the context of functional analysis, showing that every operator algebraic tricategory is equivalent to an operator Gray-category. We then categorify the Gelfand-Naimark theorem for operator algebras, inductively proving that every (small) operator algebraic tricategory is equivalent to an operator Gray-category whose objects are strict operator bicategories, which themselves consist of operator categories of Hilbert spaces and bounded operators.

Cockins Hall 228

Speaker: John Quigg

Title: Cocycle approach to duality

Abstract: We propose a new approach to "Landstad duality" (a way to recover an action or coaction up to isomorphism from the crossed product), using crossed-product duality and cocycles. The method avoids delicate averaging processes that are a feature of existing proofs. Joint with S. Kaliszewski and Magnus Landstad.

Speaker: Matthew Gillespie

Title: The Ladder Technique - A New Approach To Establishing Certain C*-algebra & Crossed Product Ideal Correspondences

Abstract: We present a new method of establishing a bijective correspondence between action and coaction invariant ideals of C*-algebras and their crossed products by a fixed locally compact group. It's been previously known that such a correspondence exists whenever the group is amenable. Our results hold for any locally compact group under a natural form of coaction invariance. This is a joint work with John Quigg, S. Kaliszewski, and Dana P. Williams.

Speaker: Paul Herstedt

Title: Classification of non-simple crossed products associated to dynamical systems: past, present and future

Abstract: Recently, advancements have been made in structure and classification theorems in the non-simple case for crossed products associated with zero-dimensional dynamical systems. A broadening of minimality has led to results showing that more crossed products than originally known are AT-algebras. Are there any more zero-dimensional dynamical systems that yield AT-algebras? What does evidence is there fore a negative answer to this question? And what would be the consequences for further research in noncommutative dynamics?

Speaker: Kun Wang

Title: About Cuntz semigroup and Cuntz comparison for C*-algebras

Abstract: Examples due to Villadsen, Rørdam, and Toms have shown that Elliott invariant is insufficient for the classification of all simple, separable, and nuclear C*-algebras. There are simple, separable, and nuclear C*-algebras that can be distinguished by their Cuntz semigroups but not by their Elliott invariant. In this talk, I will introduce the definition and some properties of the Cuntz semigroup. Brown, Perera, and Toms recovered the Cuntz semigroup for a well behaved class of simple C*-algebras by using the ingredients of the Elliott invariant—the Murray-von Neumann semigroup and the cone of lower semicontinuous traces. In this talk, we give a characterization of the Cuntz comparison for a class of C*-algebras with one non-trivial closed two-sided ideal, by using the Murray-von Neumann semigroup and the cone of lower semicontinuous traces. This is a joint work with G. Elliott.

Cockins Hall 232

Speaker: Patrick DeBonis

Title: Stable Actions of Thompson-Like Groups from Cloning Systems

Abstract: Cloning systems are a method for generalizing Thompson's groups, for example V_d, that result in a family of groups, $\mathcal{T}_d(G_*)$, whose group von Neumann algebras have been intensely studied by Bashwinger and Zarmesky in recent years. We consider the group actions of a large class of $\mathcal{T}_d(G_*)$ and show they are stable, that is, G is orbit equivalent to $G \times \mathbb{Z}$. As a corollary, we answer Bashwinger and Zaremsky question about when $\mathcal{T}_d(G_*)$ is a McDuff Group in the sense of Deprez and Vaes. This is joint work with Rolando de Santiago and Krishnendu Khan.

Speaker: Forrest Glebe

Title: Generalizing Voiculescu's Unitaries for Nilpotent Groups, and Frobenius Non-Stability

Abstract: A countable discrete group is said to be Frobenius stable if every function from the group to unitary matrices that is "almost multiplicative" in the Frobenius norm is "close" to a unitary representation in the Frobenius norm. The purpose of this talk is to explain why finitely generated nilpotent groups are Frobenius stable if and only if they are virtually cyclic. The way to do this is to come up with a formula for an almost representation of the group that generalizes Voiculescu's unitaries. This contrasts other results showing that finitely generated nilpotent groups are stable in the normalized Hilbert-Schmidt norm and normalized Hamming distance.

Speaker: Iason Moutzouris

Title: Can non-torsion amenable groups have C*-algebras of real rank zero?

Abstract: For every torsion free, discrete and amenable group G, the Kadison-Kaplansky conjecture has been verified, so $C^*(G)$ has no non-trivial projections. On the other hand, every torsion element $g \in G$, of order n, gives rise to a projection $\frac{1+g+g^2+\ldots+g^{n-1}}{n} \in C^*(G)$. Actually, if G is locally finite, then $C^*(G)$ is an AF-algebra, so it has an abundance of projections. So, it is natural to ask what happens when the group has both torsion and non-torsion elements. A result on this direction, came from Scarparo, who showed that for every discrete, infinite, finitely generated elementary amenable group, $C^*(G)$ cannot have real rank zero. In this talk, we will explain why if G is discrete, amenable and has a normal subgroup that is not locally finite but is elementary amenable of finite Hirsch length, then $C^*(G)$ does not have real rank zero.

Speaker: Marius Ionescu

Title: The Koopman representation for groupoid actions

Abstract: In this talk based on joint work with Valentin Deaconu we introduce the Koopman representation κ of a locally compact groupoid G acting on a measure space (X, μ), where μ is quasi-invariant for the action and we study the C^*-algebra $C^*(\kappa)$ generated by κ. We interpret κ as an induced representation and we prove that if the groupoid $G \ltimes X$

is amenable, then κ is weakly contained in the regular representation ρ, so we have a surjective homomorphism $C_r^*(G) \to C^*(\kappa)$. We present the particular case of Renault-Deaconu groupoids $G = G(X, T)$ acting on their unit space X and show that in some cases $C^*(\kappa) \cong C^*(G)$.

EA 160 (Final talk)

Speaker: Elizabeth Gillaspy

Title: Williams' conjecture holds for meteor graphs

Abstract: Shifts of finite type (SFTs) are central objects in dynamical systems, but they can also be modeled by graph or Cuntz-Krieger C*-algebras. Williams established in 1976 that two SFTs are conjugate (isomorphic) iff they are strong shift equivalent, iff the graph of one SFT can be converted into the other via in- and out-splitting and their inverses. He also introduced the simpler, and a priori weaker, condition of shift equivalence. Krieger later showed that two Cuntz-Krieger algebras are shift equivalent iff their ordered K_0 groups are isomorphic.

Although Williams originally claimed that shift equivalence and strong shift equivalence are the same, this statement is not true in general. Together with L. Cordeiro, D. Goncalves and R. Hazrat, we have found a new class of graphs – meteor graphs – for which shift equivalence and strong shift equivalence do in fact coincide. This talk will describe meteor graphs and sketch the proof of our result, which combines operator-algebraic, combinatorial, and monoid-theoretic ideas.

Thursday

Cockins Hall 218

Speaker: Trevor Camper

Title: A Szegő-type Limit Theorem and Associated Weyl Law

Abstract: Szegő Limit Theorems have been used to obtain semi-classical Weyl Laws for Berezin-Toeplitz Operators. In this talk, a new Szegő-Type Limit Theorem for a semiclassical setting will be presented. From this, semi-classical Weyl Laws for Berezin-Toeplitz Operators will be presented for a variety of function spaces. Finally, some applications to Gabor systems will be presented.

Speaker: Sukitha Adappa

Title: Reducible and Irreducible Operators in Separable von Neumann Algebras

Abstract: Let $\mathcal{H}$ be a Hilbert space and $\mathcal{B}(\mathcal{H})$ be the set of all bounded linear operators acting on $\mathcal{H}$. An operator T in $\mathcal{B}(\mathcal{H})$ is said to be reducible if there exists a non-trivial projection (i.e., $\neq 0, I$) in $\mathcal{B}(\mathcal{H})$ that commutes with T. Conversely, if no such projection exists, the operator T is called an irreducible operator. In 1967 Halmos introduced the concept of

reducible and irreducible operators in $\mathcal{B}(\mathcal{H})$. He further proved that, on a separable Hilbert space $\mathcal{H}$, the set of irreducible operators is a dense subset of $\mathcal{B}(\mathcal{H})$ in the operator norm.

Let $\mathcal{M}$ be a von Neumann algebra and $\mathcal{Z}(\mathcal{M})$ be the center of $\mathcal{M}$. We extend the concept of reducible and irreducible operators into the von Neumann algebra in the following sense. An operator T in $\mathcal{M}$ is called reducible if there exists a projection in the $\mathcal{M} \setminus \mathcal{Z}(\mathcal{M})$ that commutes with T. Otherwise, it is called an irreducible operator in $\mathcal{M}$.

In this talk, we investigate whether a von Neumann algebra consists entirely of reducible or irreducible operators. Further, we investigate recent developments related to the density of reducible and irreducible operators in factors and develop them for von Neumann algebras. The primary purpose of this talk is to examine the density of irreducible and reducible operators in separable von Neumann algebras.

Speaker: Michael Davis

Title: Rigidity for von Neumann Algebras of Graph Product Groups

Abstract: I will discuss recent work with Ionut Chifan and Daniel Drimbe on various rigidity aspects of von Neumann algebras arising from graph product groups whose underlying graph is a certain cycle of cliques and whose vertex groups are wreath-like product property (T) groups. In particular, I will describe all symmetries of these von Neumann algebras by establishing formulas in the spirit of Genevois and Martin's results on automorphisms of graph product groups. In doing so, I will highlight the methods used from Popa's deformation/rigidity theory as well as new techniques pertaining to graph product algebras.

Speaker: Aldo Garcia Guinto

Title: An analog of Schreier's formula for free probability theory

Abstract: Early 2022, Shlyakhtenko consider subfactors of the form $M_0 \subset M_1 = M_0 \rtimes G$ with G a finite abelian group and was able to show that the free entropy dimension of $M_0 \rtimes G$ and M_0 satisfies an inequality that is similar to that of the Schreier's formula for finite index subgroups of free groups. This led us to investigate how the following free probabilistic quantities σ, called free Stein dimension, and Δ, behave under such crossed products with G. In particular, we were able to obtain equality for σ and Δ. For σ, we do not need to assume that G is abelian. We can achieve this by applying a correspondence between the derivation of a *-subalgebra of a von Neumann algebra and a certain subspace of derivation of its crossed product by a finite group.

Cockins Hall 228

Speaker: Alain Lionel Fogang Takoutsing

Title: Distinguishing C*-algebras by their Unitary Groups;

Abstract: Given two C*-algebras A and B with isomorphic groups of unitary elements $U(A)$ and $U(B)$, are they isomorphic as real C*-algebras? We investigate this question and some of its variations when the group of unitary elements is replaced by other special groups like the group of invertible elements $\mathrm{GL}(A)$ and $\mathrm{GL}(B)$.

Speaker: Joachim Zacharias

Title: Almost Elementary C*-Dynamics and $\mathcal{Z}$-stability

Abstract: Motivated by the Toms-Winter conjecture and Kerr's notion of almost finiteness for actions of amenable discrete groups on compact metric spaces, which may be regarded as a dynamical analogue of $\mathcal{Z}$-stability in this setting, we propose a generalisation of almost finiteness to actions of discrete groups on general C*-algebras which we coin almost elementary actions. Our starting point is a generalisation of Kerr's notion of a castle which we define as a simultaneous approximation of the algebra and the action, up to an arbitrarily small remainder in a dynamically tracial sense. It turns out that various different natural smallness conditions are all equivalent. In the case of no group action our condition is a weak form of being tracially AF or having tracial nuclear dimension 0. We can show that in this case almost elementariness is equivalent to $\mathcal{Z}$-stability for separable simple nuclear algebras, thus it maybe added as another equivalent condition to the Toms-Winter conjecture. Moreover, almost elementary actions lead to $\mathcal{Z}$-stable crossed products, in line with it being a kind of dynamical $\mathcal{Z}$-stability. We also present aspects of a dynamical version of the Cuntz-semigroup which is needed for concept and a number of applications. Joint work with Joan Bosa, Francesc Perera and Jianchao Wu.

Speaker: Zhuang Niu

Title: A classification of Villadsen algebras

Abstract: The class of Villadsen algebras is a class of simple unital approximately homogeneous (AH) C*-algebras which are not $\mathcal{Z}$-stable. This class contains C*-algebras which share the same value of the Elliott invariant with an AI algebra but are not isomorphic to that AI algebra. Hence Villadsen algebras are not covered by the classification theorem with the Elliott invariant. In the talk, one considers the Villadsen algebras with seed spaces finite products of a given finite-dimensional contractible metrizable space, and then they can be shown to be classified by the K_0-group together with the radius of comparison. This is a joint work with George Elliott and Chunguang Li.

Speaker: Alan Wiggins

Title: Co-Isometries Induced by Inner Functions on the Hardy Space of the Disk

Abstract: Let ϕ be an inner function on the unit disk $\mathbb{D}$ satisfying $\phi(0) = 0$. On the Hardy space $H^2(\mathbb{D})$, ϕ induces a composition operator C_ϕ defined by $C_\phi(f) = f \circ \phi$ for all $f \in H^2(\mathbb{D})$. A well-known result of Nordgren gives that C_ϕ is an isometry, and if C_ϕ is non-unitary, Cowen and MacCluer showed that the kernel of C_ϕ^* is infinite-dimensional. We describe the kernel of C_ϕ^* completely in the case where ϕ is a Blaschke product. We also investigate the product $C_\phi^* C_\psi$ in the case where ψ is inner and $\psi(0) = 0$. This is joint work with John Clifford, Mike Dabkowski, and Yunus Zeytuncu (UM-Dearborn).

Cockins Hall 232

Speaker: Konrad Aguilar

Title: The strongly Leibniz property and the Gromov–Hausdorff propinquity

Abstract: We construct a new version of the dual Gromov–Hausdorff propinquity that is sensitive to the strongly Leibniz property. In particular, this new distance is complete on the class of strongly Leibniz quantum compact metric spaces. Then, given an inductive limit of C*-algebras for which each C*-algebra of the inductive limit is equipped with a strongly Leibniz L-seminorm, we provide sufficient conditions for placing a strongly Leibniz L-seminorm on an inductive limit such that the inductive sequence converges to the inductive limit in this new Gromov–Hausdorff propinquity. As an application, we place new strongly Leibniz L-seminorms on AF-algebras using Frobenius–Rieffel norms, for which we have convergence of the Effros–Shen algebras in the Gromov–Hausdorff propinquity with respect to their irrational parameter. (This is joint work with Stephan R. Garcia, Elena Kim, and Frederic Latremoliere). arXiv:2301.05692

Speaker: Benjamin Passer

Title: Local Geometry of Matrix Convex Sets

Abstract: A matrix convex set over Euclidean space consists of different levels, indexed by a matrix dimension n. Each indidual level is a collection of tuples of $n \times n$ matrices, and as n varies, the different levels have compatibility conditions. Notions of extreme point for matrix convex sets vary, and in this talk I will discuss how extreme points in level 1 may be identified using local information.

Speaker: Matthew Lorentz

Title: The Hochschild Cohomology of Roe Type Algebras

Abstract: Many times in analysis we focus on the "small scale" structure of a metric space, e.g. continuity, derivations, etc. However, to examine the "large scale" structure of a metric space we turn to coarse geometry. To help us study the coarse geometry of a space we look at invariants, one such invariant is the uniform Roe algebra of the space. Indeed, if a metric space (X, dX) is coarsely equivalent to (Y, dY) then their uniform Roe algebras are isomorphic. Originally looked at as a method compute higher index theory, uniform Roe algebras are a highly tractable C*-algebra contained in the bounded operators on square summable sequences indexed by a metric space X (note that purely bornological definitions exist). In this talk we will look at the Hochschild cohomology of uniform Roe algebras. Hochschild cohomology can be thought of as a noncommutative analog of multivector fields. We will first give the relevant definitions and look at a few examples. We will then explore the Hochschild cohomology of uniform Roe algebras with coefficients in various uniform Roe bimodules.

Speaker: Ian Thompson

Title: An approximate unique extension property for completely positive maps

Abstract: Given a unital subspace of continuous functions over a compact Hausdorff space X, the Choquet boundary consists of the points in X for which Dirac measure is the unique representing measure at the given point. It is a classical fact that the closure of the Cho-

quet boundary determines a minimal isometric representation for the underlying subspace. Through highly non-trivial work of many authors, a non-commutative counterpart to this vision exists and has received great interest over the last decade. Here, we take a localized approach to studying a corresponding unique extension property by considering the approximate unitary equivalence class of a given *-representation. Work of Voiculescu guarantees that these *-representations form a broad class, but notwithstanding this, there are many notable restrictions that arise. In particular, a natural variation on the usual unique extension property naturally arises over the approximate unitary equivalence class of a *-representation with the unique extension property. The resulting approximate unique extension property allows us to reframe Arveson's hyperrigidity conjecture whenever the generating C*-algebra is postliminal.

EA 160 (Final talk)

Speaker: Brent Nelson

Title: Von Neumann dimension for non-tracial states

Abstract: The notion of von Neumann dimension for a tracial von Neumann algebra (M, τ) goes all the way back to Murray and von Neumann. Given a representation $(\mathcal{H}, \pi)$ of M, there exists an isometry intertwining this representation with the (left) diagonal representation on $L^2(M, \tau) \otimes \ell^2$. Hence the projection p onto the image of $\mathcal{H}$ is an element of the commutant $M^{op} \bar{\otimes} B(\ell^2)$, and Murray and von Neumann defined the von Neumann dimension of $(\mathcal{H}, \pi)$ to be $\tau^{op} \otimes Tr(p)$. This quantity has been used extensively throughout the theory of von Neumann algebras to define other numerical invariants, from Jones' index of a subfactor to Connes and Shlyakhtenko's ℓ^2-Betti numbers of von Neumann algebras. In this talk, I will discuss how the basic construction allows one to extend the theory to pairs (M, φ) where φ is a faithful normal state that is allowed to be non-tracial. I will discuss properties of this dimension and how it can be used to recover the index for certain inclusions of type III factors. This is based on joint work with Aldo Garcia Guinto and Matthew Lorentz.