GREAT PLAINS OPERATOR THEORY SYMPOSIUM

June 14^{th} *to June* 18^{th} *2010*

UNIVERSITY OF DENVER

Frédéric Latrémolière, Ph.D. (PI)
Alvaro Arias, Ph.D.
Nic Ormes, Ph.D.

GPOTS 30^{th} edition

Contents

CHAPTER 1

Welcome

Dear Colleagues,

Welcome to the University of Denver for this thirstiest anniversary of GPOTS! It is with great pleasure that Alvaro, Nic and I invite you to enjoy the mile-high city and our beautiful campus. The University of Denver, the oldest independent university in the Rocky Mountain region, enrolls approximately 5,300 undergraduate and 6,000 graduate students. The department of Mathematics offers bachelors, masters and PhD degrees in pure mathematics, and counts twelve faculty members. The Dean of the division of Natural Sciences and Mathematics, Alayne Parson, one of the mathematics faculty member, and the associate provost for research, Cathy Potter, provided the local funds supporting this edition of GPOTS. Of course, this conference is also supported by you, its many participants. In addition, NSF grant DMS 0852495 will provide the funds for financial support – in the form of partial reimbursement - for GPOTS participants. We are grateful to all who made this event possible.
During the week of June 14 to June 18, we have scheduled sixty talks, a reception buffet on Monday evening, a banquet in a downtown restaurant on Tuesday evening, and we will leave Wednesday afternoon free so that you can enjoy our city and, if your heart is so inclined, the front range of the Rocky Mountains. This brochure contains a schedule of events, as well as a schedule of all talks, and a list of talks with their full abstracts. We also included various useful information, from important phone numbers to credentials for login on the wireless network on campus. Your welcome package also includes a campus map and other material to make your visit as agreeable as possible. Of course, Alvaro, Nic and I remain available to help you during your stay.

An important document included in this welcome package is a reimbursement form. When you sign in with us, we will also provide you with either a W9 or a W8BEN form. These two forms, accompanied with original receipts, should be returned to us as soon as possible, so that we can process them and provide partial reimbursements to participants within the limits of our budget. Please return them by July 8th for full consideration. We will process the reimbursement in inverse order of academic seniority, giving highest priority to graduate students. The source for this financial support of participants is the NSF grant DMS 0852495 and we are grateful to the NSF for its generous support.

I am looking forward to sharing this week with you and I wish you a great time while at D.U.,

Sincerely,

Frédéric Latrémolière, Ph.D.
Assistant Professor
Department of Mathematics
University of Denver

CHAPTER 2

Useful Information

This section provides you with phone numbers and other data which may prove useful during your stay at the University of Denver. **In Denver, you must compose all phone numbers as if they were long distance, i.e. starting with 1 and then the area code followed by the number.** The local area codes are 303 and 720. All campus numbers are (303) area code and start with 871.

1. Organizer

- Frédéric Latrémolière, PhD, *Assistant Professor, PI, Department of Mathematics, University of Denver*
- Email: frederic@math.du.edu
- Office: John Greene Hall 211
- Phone number (Cell): *See paper brochure*
- Feel free to contact me during GPOTS at any time. I will try my best to help you.

2. Co-Organizers

(1) Alvaro Arias, PhD, *Associate Professor, Chair, Department of Mathematics, University of Denver*
- Email: aarias@du.edu
- Office: John Greene Hall 203
- Phone number (Cell): *See paper brochure*

(2) Nic Ormes, PhD, *Associate Professor, Department of Mathematics, University of Denver*
- Email: normes@du.edu
- Office: John Greene Hall 208

3. Department of Mathematics, University of Denver

- Building: John Greene Hall
- Front Office: John Greene Hall 203
- Chair Assistant: Liane Beights, (303) 871 3344, lbeights@math.du.edu
- Technical Assistant: Don Oppliger, (303) 871 3072, doppliger@math.du.edu
- Chair: Alvaro Arias, PhD
- Address: 2360 S Gaylord St, Denver, Colorado 80208
- Department Email: info@math.du.edu

4. Campus Security

- University of Denver Campus Security Emergency Number: (303) 871-3000. *Please dial 911 first for serious emergencies.*
- University of Denver Campus non-emergency number: (303) 871-2334

5. Taxi Numbers

- Metro Cab: (303) 333-3333
- Yellow Cab: (303) 777-7777

6. Shuttle Numbers (Airport)

- ABC Shuttle Service: (800) 288-0668
- Denver Express Shuttle: (303) 342-3424
- Super Shuttle: (303) 370-1300

7. Regional Transit District (Public transit)

- Information: (303) 299-6000

8. Web Resources

GPOTS Website: `http://www.math.du.edu/~ frederic/gpots2010/index.html`
Department of Mathematics, University of Denver: `http://www.math.du.edu/`
Campus Maps: `http://www.du.edu/utilities/maps.html`
Regional Transit District: `http://www.du.edu/utilities/maps.html`

9. Wireless Networking on the campus

We have a special guest account for GPOTS participants to log on to the wireless network on our campus. Please follow the following instructions:

(1) Make sure your wireless card is turned on and then select the **DU Guest Wireless network**.
(2) Open your web browser (Internet Explorer, Firefox, Safari, Etc.)
(3) A welcome screen will be displayed. Please click the **registered** button and then use the following DU Guest ID and Password to gain access as a guest user:
Guest ID: T11113597
Password: woo8knox

10. Lunch and Dinner Options

Many lunch and dinner options are available in Denver, including in the neighborhood of the university. There are three locations with many options we advise from the campus.

- The closest options around campus are located on the north side of the corner of University Boulevard and Evans Street, or South High Street and Evans Avenue. These are ideal locations for lunch.
- Cherry Creek mall and its neighborhood provides many eating options, from food court to very nice restaurant, fit for dinner. To go to Cherry Creek from our campus, you may ride the bus Route 24 (northbound), which stops in the RTD light rail station north of our campus. The northbound Route 24 stops at gate C in that station. The ride takes about fifteen minutes, and the bus frequency during the daytime is about one per thirty minutes.
- Downtown provides many more options. To go downtown from our campus, please take the RTD light rail northbound.

Note that if you are at Cherry Creek, you can go directly to downtown using the bus 83L (westbound) and 3L (westbound). In addition, Cherry Creek mall provides a grocery store (Safeway) and a pharmacy (Rite Aid) if needed.

11. Financial Support

We can provide partial financial support in the form of partial reimbursement for travel and lodging for the conference thanks to the NSF grant DMS 0852495. To get reimbursed, you must follow this process:

(1) Fill in a reimbursement form for GPOTS. It is the blue form in your welcome package. It can also be downloaded from www.gpots.org (local information) and can be obtained from a GPOTS staffer.
(2) Fill in a W-9 form if you are a US citizen, and a W-8 BEN otherwise. This form is handed to you when you sign in for this conference.
(3) Return to a GPOTS staffer or mail to the Department of Mathematics of the University of Denver these two forms with all original receipts for the expenses you listed.

To be reimburse, please make sure that all the necessary information is provided by July, 8 2010. You should expect a up to a few weeks of processing time.

12. Thanks

The local organizers of GPOTS 2010 wish to thank the following persons for their help during the organization of this conference.

Dave Larson	Judith Packer	Cathy Potter
Cathy Grieve	Alayne Parson	Richard Michel
Liane Beights	Don Oppliger	Jenya Kirshtein
Grace	Molly	

and, of course, all speakers and participants to GPOTS 2010!

CHAPTER 3

Events Schedule

GPOTS will be punctuated by various events during the conference week. We collect them in this section, to avoid cluttering the talk schedule in the next section. **All events are free except the banquet on Tuesday.**

Day	Time	Event
Monday June 14^{th}	8:00am–9:00am	Breakfast, Registration
	10:00am–10:30am	Morning Snacks
	12:15pm–2:10pm	Lunch (not provided)
	3:00pm–3:30pm	Afternoon Snacks
	5:00pm–7:00pm	Reception in the School of Hotel, Restaurant and Tourism Management of DU. *All invited!*
Tuesday June 15^{th}	8:00am–9:00am	Breakfast
	10:00am–10:30am	Morning Snacks
	12:15pm–2:10pm	Lunch (not provided)
	3:00pm–3:30pm	Afternoon Snacks
	6:00pm–10:00pm	Banquet (Maggiano). *Fee required.*
Wednesday June 16^{th}	8:00am–9:00am	Breakfast
	10:00am–10:30am	Morning Snacks
	12:15pm–	Free afternoon.
Thursday June 17^{th}	8:00am–9:00am	Breakfast
	10:00am–10:30am	Morning Snacks
	12:15pm–2:10pm	Lunch (not provided)
	3:00pm–3:30pm	Afternoon Snacks
	8:00pm–10:00pm	Soccer Field on DU Campus.
Friday June 18^{th}	8:00am–9:00am	Breakfast
	10:00am–10:30am	Morning Snacks
	12:15pm–2:10pm	Lunch (not provided)
	3:00pm–3:30pm	Afternoon Snacks

CHAPTER 4

Schedule of Talks

1. Monday, June 14th

Time	Room: Sturm 451		
9am–10am	Ian Putnam *C*-algebras associated with projection method tilings*		
10:30am–11:30am	Man-Duen Choi *The Stinespring Theorem made simple but difficult*		
11:45am–12:15pm	Richard Kadison *The Heisenberg - von Neumann Puzzle*		
Time	**Sturm 451**	**Sturm 453**	**Sturm 454**
2:10pm–2:30pm	Zhe Liu *The von Neumann - Heisenberg Puzzle*	Hassan Yousefi *C-orbit reflexive operators*	Benton Duncan *Semicrossed Products from Integral Domains*
2:40pm–3:00pm	Alan Paterson *A topological equivariant K-theory for groupoids*	Martin Argerami *The Schur-Horn theorem in von Neumann algebras*	Will Grilliette *A New View of Presentation Theory for C*-algebras*
3:30pm–3:50pm	Eitan Angel *A Geometric Construction of Cyclic Cocycles on Twisted Convolution Algebras*	Jana Bohnstengel *The construction of a wavelet basis on fractals*	Haskell P. Rosenthal *The closeability property for algebras of bounded linear operators on a complex Banach space*
4:00pm–4:20pm	Norio Nawata *Fundamental group of simple C^*-algebras with unique trace*	Franz Luef *Projections in rotation algebras*	Anna Skripka *Estimates for multiple operator integrals.*
4:30pm–4:50pm	Roger Smith *The relative weak asymptotic homomorphism property for inclusions of finite von Neumann algebras*	Sarah Wright *Aperiodicity in Topological k-Graphs*	Z. Patrick Pan *Derivable mappings and derivations*

2. Tuesday, June 15^{th}

Time	Room: Sturm 451		
9am–10am	Christian Skau *Orbit equivalence for minimal actions of finitely generated abelian groups on the Cantor set.*		
10:30am–11:30am	Ron Douglas *Confluent Operator Algebras and the Closeability Property*		
11:45am–12:15pm	Marius Ionescu *Morita Equivalence for Fell Bundle C*-algebras*		
Time	**Sturm 451**	**Sturm 453**	**Sturm 454**
2:10pm–2:30pm	Dave Larson *Operator valued measures, mappings between von Neumann algebras, and frame theory*	Nathan Brownlowe *Semigroup crossed products and graph algebras*	Manjul Gupta *Generalized Lorentz Spaces and their operator ideals*
2:40pm–3:00pm	Alex Kumjian *Hausdorff Measures and KMS States*	Alan Wiggins *Strong Singularity Constants for Type II_1 Subfactor Inclusions*	Ramesh Garimella *On solutions of an operator equation*
3:30pm–3:50pm	Valentin Deaconu *Group actions on topological graphs*	Laura Marti Perez *A continuous Fourier algebra for a locally compact groupoid*	Terry Loring *Almost commuting matrices with reality constraints in condensed matter physics*
4:00pm–4:20pm	John Quigg *Multiplier bimodules and Cuntz-Pimsner algebras*	Nura Patani *Obstructions to a general characterization of graph correspondences*	Daniel Redelmeier *A Lower Bound for the Spectral Radius of Random Walks on the Baumslag Solitar Group.*
4:30pm–4:50pm	Ping Wong Ng *On purely infinite corona algebras*	Wai-Shing Tang *Frames and their associated H_F^p-subspaces*	Amy Chambers *An Example of a Crossed Product by an Endomorphism*

3. Wednesday, June 16th

Time	Room: Sturm 451		
9am–10am	Thierry Giordano *Generalizations of Voiculescu's Weyl-von Neumann Theorem.*		
10:30am–11:30am	Toke Meier Carlsen *Algebraic Cuntz-Pimsner rings*		
11:45am–12:15pm	Paulette Willis *Group Actions on the C*-algebras of Labeled Graph*		
Time	**Sturm 451**	**Sturm 453**	**Sturm 454**
2:10pm–2:30pm			
2:40pm–3:00pm			
3:30pm–3:50pm			
4:00pm–4:20pm			
4:30pm–4:50pm			

4. Thursday, June 17th

Time	Room: Sturm 451		
9am–10am	Marc Rieffel *Best approximation from C*-subalgebras*		
10:30am–11:30am	Magnus Landstad *Back to basics: Another look at Morita equivalence.*		
11:45am–12:15pm	Jonathan Brown *A New Characterization of Generalized Fixed Point Algebras for Actions of Principal and Proper Groupoids*		
Time	**Sturm 451**	**Sturm 453**	**Sturm 454**
2:10pm–2:30pm	Robert Hazlewood *Strength of convergence in the orbit space of a groupoid*	Wu Jing *Derivations Characterized by Action on Zero Products*	Christopher Jankowski *On q-positive maps and related results for E_0-semigroups*
2:40pm–3:00pm		Trieu Le *Toeplitz operators on harmonic Bergman spaces*	Jonathan Von Stroh *Lifting module maps over different noncommutative domain algebras*
3:30pm–3:50pm	Geoff Goehle *The Spectrum of Regular Groupoid Crossed Products*	Yun-Su Kim *Beurling-type theorem on arbitrary Hilbert spaces*	Jan Cameron *Mixing subalgebras of finite von Neumann algebras*
4:00pm–4:20pm	Ami Viselter *Covariant representations of subproduct systems*	Hiroyasu Hamada *Toeplitz-composition C^*-algebras for certain finite Blaschke products*	Igor Nikolaev *Noncommutative localization*
4:30pm–4:50pm	Kamran Reihani *Spectral Triples for Crossed Products*	Jeremy Greene *Classifying Noncommutative Plurisubharmonic Polynomials*	Kevin Manley *The Discrete Fourier-Riccati-Bessel Transform for Robin Boundary Conditions*

5. Friday, June 18^{th}

Time	Room: Sturm 451
9am–10am	Vern Paulsen *Tensor Products of Operator Systems*
10:30am–11:30am	Robert Powers *Type III E_0-semigroups, or "Where have all the units gone?"*
11:45am–12:15pm	Emily Redelmeier *Fluctuations of random matrices and real second-order freeness*
12:30pm–1:00pm	Allan Donsig *Amalgams of Inverse Semigroups and C^*-algebras*

CHAPTER 5

Talks Titles and Abstracts

A GEOMETRIC CONSTRUCTION OF CYCLIC COCYCLES ON TWISTED CONVOLUTION ALGEBRAS

EITAN ANGEL
University of Colorado, Boulder

Date: *Monday, June* 14th Time: *3:30pm–3:50pm* Room: *Sturm 451*

ABSTRACT: Abstract: We will give a construction of cyclic cocycles on convolution algebras twisted by gerbes over discrete translation groupoids. In his seminal book, Connes constructs a map from the equivariant cohomology of a manifold carrying the action of a discrete group into the periodic cyclic cohomology of the associated convolution algebra. Furthermore, for proper étale groupoids, J.-L. Tu and P. Xu provide a map between the periodic cyclic cohomology of a gerbe twisted convolution algebra and twisted cohomology groups.
Our focus will be the convolution algebra with a product defined by a gerbe over a discrete translation groupoid. When the action is not proper, we cannot construct an invariant connection on the gerbe; therefore to study this algebra, we instead develop simplicial notions related to ideas of J. Dupont to construct a simplicial form representing the Dixmier-Douady class of the gerbe. Then by using a JLO formula we define a morphism from a simplicial complex twisted by this simplicial Dixmier-Douady form to the mixed bicomplex of certain matrix algebras. Finally, we define a morphism from this complex to the mixed bicomplex computing the periodic cyclic cohomology of the twisted convolution algebras.

THE SCHUR-HORN THEOREM IN VON NEUMANN ALGEBRAS

MARTIN ARGERAMI
University of Regina

Date: *Monday, June* 14th Time: *2:40pm–3:00pm* Room: *Sturm 453*

ABSTRACT: The Schur-Horn theorem is a celebrated result in matrix analysis. In this talk I will describe the problem and discuss several infinite-dimensional generalizations in the context of operator algebras, including recent joint work with P. Massey.

THE CONSTRUCTION OF A WAVELET BASIS ON FRACTALS

JANA BOHNSTENGEL
University of Iowa

Date: *Monday, June* 14th Time: *3:30pm–3:50pm* Room: *Sturm 453*

ABSTRACT: We will describe the construction of a wavelet basis with respect to some fractal measure given by a one-dimensional iterated function system. The IFS is assumed to satisfy the open set condition and the measure under consideration is obtained from the measure of maximal entropy for the IFS. In this way we generalise the construction of Jorgensen and Dutkay for the 1/3-Cantor set.

A NEW CHARACTERIZATION OF GENERALIZED FIXED POINT ALGEBRAS FOR ACTIONS OF PRINCIPAL AND PROPER GROUPOIDS

JONATHAN BROWN
Ben Gurion University

Date: *Thursday, June* 17th Time: *11:45am–12:15pm* Room: *Sturm 451*

ABSTRACT: The generalized fixed point algebra of a dynamical system is the noncommutative analogue of the orbit space for group actions. Since Rieffel introduced them, generalized fixed point algebras have been used to study a wide range of topics including Brauer semigroups, duality and graph algebras. The problem with generalized fixed point algebras is they are often quite mysterious and their use is predicated on finding a more concrete realization of them. In previous work, we defined a generalized fixed point for groupoid dynamical systems that is consistent with Rieffel's earlier definition. In this talk we will give a more concrete realization of these algebras when the groupoid is principal and proper. We will prove some consequences of this characterization, including that if a principle and proper groupoid acts on a C^*-algebra A then A is isomorphic to a pull back of the generalized fixed point algebra.

SEMIGROUP CROSSED PRODUCTS AND GRAPH ALGEBRAS

NATHAN BROWNLOWE
University of Wollongong

Date: *Tuesday, June* 15th Time: *2:10pm–2:30pm* Room: *Sturm 453*

ABSTRACT: Crossed products of C^*-algebras by endomorphisms were first used by Cuntz in the early 1980s to describe the relationship between the Cuntz algebras and their UHF cores. Various generalisations to semigroups of endomorphisms have since appeared. In this talk, we examine Ruy Exel's recent construction of a crossed product by an endomorphism, and Nadia Larsen's generalisation of Exel's work to semigroups of endomorphisms. In particular, we examine the connection between these crossed products and the C^*-algebras associated to directed graphs and higher-rank graphs.

MIXING SUBALGEBRAS OF FINITE VON NEUMANN ALGEBRAS

JAN CAMERON
Vassar College

Date: *Thursday, June* 17^{th} Time: *3:30pm–3:50pm* Room: *Sturm 454*

ABSTRACT: It is well-known that mixing properties of probability measure-preserving transformations can be generalized to actions of a discrete groups on finite von Neumann algebras. Recently, Jolissaint and Stalder observed that the mixing properties of the action of a discrete abelian group G on a von Neumann algebra M are encoded by certain properties of the associated inclusion $L\mathsf{G} \subset \mathsf{M} \rtimes \mathsf{G}$. Motivated by their results, we introduce and study various mixing properties of inclusions of finite von Neumann algebras. This perspective yields some applications to ergodic theory, as well as a characterization of mixing von Neumann subalgebras in terms of their normalizers, and a number of examples of mixing phenomena in the operator algebra setting. This is ongoing joint work with Junsheng Fang and Kunal Mukherjee.

ALGEBRAIC CUNTZ-PIMSNER RINGS

TOKE MEIER CARLSEN
Norwegian University of Science and Technology

Date: *Wednesday, June* 16^{th} Time: *10:30am–11:30am* Room: *Sturm 451*

ABSTRACT: The Cuntz-Pimsner algebra construction has turned out to be an important tool in C*-algebra with which one can construct many interesting classes of C*-algebras such as crossed product by a single automorphism, Cuntz-Krieger algebras, graph algebras and Exel-Laca algebras.
I will in this talk tell how to adapt this construction to a purely algebraic setting, and how we thus recover some well know classes of rings such as algebraic crossed products by single automorphisms, corner skew Laurent polynomial rings by single corner automorphisms, and Leavitt path algebras.
I believe this construction is not only interesting from a purely algebraic point of view, but also from an operator algebraic point of view, and I will in my talk try to emphasize this by highlighting the differences between the purely algebraic case and the operator algebraic case (and there are some nontrivial ones).
This is joint work with Eduard Ortega.

AN EXAMPLE OF A CROSSED PRODUCT BY AN ENDOMORPHISM

AMY CHAMBERS
Tennessee Technological University

Date: *Tuesday, June* 15^{th} Time: *4:30pm–4:50pm* Room: *Sturm 454*

ABSTRACT: In this talk we will look at an example of a spatial crossed product of a C*-algebra by an endomorphism. Specifically, we will look at the example of the tensor product of Cuntz algebras, $\mathcal{O}_{d_1} \otimes \mathcal{O}_{d_2}$, which is the spatial crossed product of the Cuntz algebra $\mathcal{O}_{d_1 d_2}$ by an endomorphism. We will then look at this example in the context of a more universal definition of a crossed product by an endomorphism.

THE STINESPRING THEOREM MADE SIMPLE BUT DIFFICULT

MAN-DUEN CHOI
University of Toronto

Date: *Monday, June* 14^{th} Time: *10:30am–11:30am* Room: *Sturm 451*

ABSTRACT: The Stinspring Theorem is sort of standard structure theorem about the structure of completely positive linear maps. For many years of my good old dreams in pure mathematics, I thought that I knew everything about completely positive linear maps. Suddenly, I was awaken in the new era of quantum computer, for the nightmares of incomprehensibility of completely positive linear maps. Here, I will show many non-trivial aspects of non-commutative analysis, even in the very low dimensional case.

GROUP ACTIONS ON TOPOLOGICAL GRAPHS

VALENTIN DEACONU
University of Nevada, Reno

Date: *Tuesday, June* 15^{th} Time: *3:30pm–3:50pm* Room: *Sturm 451*

ABSTRACT: joint work with Alex Kumjian and John Quigg We define the action of a locally compact group G on a topological graph E. This action induces a natural action of G on the C^*-correspondence $\mathcal{H}(E)$ and on the graph C*-algebra $C^*(E)$. If the action is free and proper, then $C^*(E) \rtimes_r G$ is strongly Morita equivalent to $C^*(E/G)$. We define the skew product of a locally compact group G by a topological graph E via a cocycle $c : E^1 \to G$. The group acts freely and properly on this new topological graph $E \times_c G$. If G is abelian, there is a dual action on $C^*(E)$ such that $C^*(E) \rtimes \hat{G} \cong C^*(E \times_c G)$. We also define the fundamental group and the universal covering of a topological graph.

AMALGAMS OF INVERSSE SEMIGROUPS AND C*-ALGEBRAS

ALLAN DONSIG
University of Nebraska, Lincoln

Date: Time: *2:40pm–3:00pm* Room: *Sturm 451*

ABSTRACT: This talk is based on joint work with Steven Haataja and John Meakin. We connect certain amalgams of inverse semigroups and of their associated C*-algebras and using this to describe some amalgams of C*-algebras. Precisely, an amalgam of inverse semigroups $[S, T, U]$ is full if U contains all of the idempotents of S and T. It turns out the C*-algebra of a full amalgam $[S, T, U]$ is the amalgam of the C*-algebras of S and T over the C*-algebra of U; this result is not true for general amalgams of inverse semigroups. As applications, we consider the structure of certain amalgamated free products of C^*-algebras, including finite-dimensional C*-algebras, the Toeplitz algebra, and Toeplitz C*-algebras of graphs.

CONFLUENT OPERATOR ALGEBRAS AND THE CLOSEABILITY PROPERTY

RON DOUGLAS
Texas A&M

Date: *Tuesday, June* 15^{th} Time: *10:30am–11:30am* Room: *Sturm 451*

ABSTRACT: In a paper written in the sixties, Arveson introduced the notion of closeability for operator algebras. An algebra of operators is said to have this property if every densely defined linear transformation that commutes with the operators in the algebra, is closeable. His interest in the concept was the connection he established between it and the transitive algebra problem. In recent joint work with Bercovici, Foias and Pearcy, we introduce a notion for algebras of operators called confluence which we show implies closeability. The definition of confluence involves a kind of transitivity of the action of the operators in the algebra using quotients. We specialize the study to the algebras of operators obtained from the H^∞ functional calculus for a contraction. We obtain conditions on the contraction for the algebra to be confluent and hence have the closeability property. Moreover, we obtain various structural results for "confluent contractions" which are related to the theory of canonical models. In particular, we obtain new results, not in the language of confluence or closeability, on when a contraction operator is quasi-similar to a unilateral shift of multiplicity one.

SEMICROSSED PRODUCTS FROM INTEGRAL DOMAINS

BENTON DUNCAN
North Dakota State University

Date: *Monday, June* 14th Time: *2:10pm–2:30pm* Room: *Sturm 454*

ABSTRACT: We investigate some universal operator algebras for integral domains. In particular we show that the associated nonselfadjoint universal algebra can be represented as a semicrossed product by a discrete abelian monoid. We also consider unitary representations of such algebras with respect to the universal algebra corresponding to the field of fractions for the integral domain.

ON SOLUTIONS OF AN OPERATOR EQUATION

RAMESH GARIMELLA
University of Central Arkansas

Date: *Tuesday, June* 15th Time: *2:40pm–3:00pm* Room: *Sturm 454*

ABSTRACT: Let A be a bounded linear operator on a complex Banach space. A problem, motivated by the operator method to solve some non-linear partial differential equations, is whether there exists a bounded linear operator B such that (i) $AB + BA$ is of rank one, and (ii) $I + f(A)B$ is invertible for every function f analytic in a neighborhood of the spectrum of A. If either the point spectrum or the residual spectrum of A is non-empty, then there exists a solution B to (i) and (ii). In the event the spectrum of A consists of only continuous spectral values, we give necessary and sufficient conditions for the existence of such a B.

GENERALIZATIONS OF VOICULESCU'S WEYL-VON NEUMANN THEOREM.

THIERRY GIORDANO
University of Ottawa

Date: *Wednesday, June* 16th Time: *9am–10am* Room: *Sturm 451*

ABSTRACT: Let A be a unital separable C*-algebra and H be an infinite dimensional Hilbert space. in 1976, D. Voiculescu proved that any two unital essential *-homomorphisms from A to B(H) are approximately unitarily equivalent.
In this talk I will present localized versions of Voiculescu's theorem, which are obtained by specializing either the co-domaim or the domain of the *-homomorphisms. These results provide new characterizations of properly infinite injective von Neumann factors and of nuclear separable C*-algebras.
This is a joint work with A. Ciuperca, Z. Niu and P. Ng.

THE SPECTRUM OF REGULAR GROUPOID CROSSED PRODUCTS

GEOFF GOEHLE

Date: *Thursday, June* 17^{th} Time: *3:30pm–3:50pm* Room: *Sturm 451*

ABSTRACT: We prove that given a regular groupoid G whose isotropy subgroupoid S has a Haar system, along with a dynamical system (A,G), there is an action of G on the spectrum of the crossed product C*(S,A) such that the spectrum of C*(G,A) is homeomorphic to the orbit space of this action via induction.

CLASSIFYING NONCOMMUTATIVE PLURISUBHARMONIC POLYNOMIALS

JEREMY GREENE
University of California, San Diego

Date: *Thursday, June* 17^{th} Time: *4:30pm–4:50pm* Room: *Sturm 453*

ABSTRACT: In this talk, we will study noncommutative plurisubharmonic (nc plush) polynomials. We call a noncommutative polynomial nc plush if it has an nc complex hessian that is positive semidefinite when evaluated on all tuples of real $n \times n$ matrices for every size n.
Bill Helton, Victor Vinnikov, and I have classified all nc plush polynomials. An nc polynomial p is nc plush if and only if it has the form

$$p = \sum f_j^T f_j + \sum k_j k_j^T + F + F^T \tag{1}$$

where f_j, k_j, F are all nc analytic.
I have also studied nc polynomials which are nc plush on an nc open set. It turns out, if p satisfies this locally nc plush hypothesis, then p is everywhere nc plush, hence of the form (1). This uses a special Gram-like representation of nc quadratics on the nc complex hessian of a polynomial.

A NEW VIEW OF PRESENTATION THEORY FOR C*-ALGEBRAS

WILL GRILLIETTE
University of Nebraska, Lincoln

Date: *Monday, June* 14th Time: *2:40pm–3:00pm* Room: *Sturm 454*

ABSTRACT: In this talk, I offer an alternative presentation theory for C*-algebras with applicability to various other normed structures. Specifically, the set of generators is equipped with a nonnegative-valued function which ensures existence of a C*-algebra for the presentation. This modification allows clear definitions of a "relation" for generators of a C*-algebra and utilization of classical algebraic tools, such as Tietze transformations.

Further, I will demonstrate a behavior alien to algebraic presentation theory, yielding a bifurcation theory for isomorphism classes. As an example, I will discuss the universal C*-algebra of an invertible element, given by the presentation

$$\langle (x,t),(y,s)|xy = yx = 1\rangle_{\mathbf{1C^*}},$$

where $t, s \geq 0$. The isomorphism classes which arise depend on a numeric condition on the product ts. If $ts = 1$, the algebra is $C(\mathbb{T})$. If $ts > 1$, the algebra is $C[0,1] *_{\mathbb{C}} C(\mathbb{T})$, the free product with amalgamation along the scalars.

GENERALIZED LORENTZ SPACES AND THEIR OPERATOR IDEALS

MANJUL GUPTA
I.I.T.Kanpur

Date: *Tuesday, June* 15th Time: *2:10pm–2:30pm* Room: *Sturm 454*

ABSTRACT: In this paper, we introduce generalized Lorentz Sequence Spaces $l_{p,q,M}$ which are defined with the help of an Orlicz function M and for different positive indices p and q. We study their structural properties and prove that they are perfect sequence paces. Besides we show that these spaces coincide with the Orlicz sequence space l_M for $p = q$ and proper inclusions hold for $p \neq q$. Lastly we prove that the operator ideals defined with the help of these sequence spaces and additive s-number of linear operators are quasi-Banach operator ideals. The results of this paper include as particular cases the work of earlier mathematicians e.g I . A . Novoselskij (1964) and A. Pietsch (1963 ,1972) .

TOEPLITZ-COMPOSITION C^*-ALGEBRAS FOR CERTAIN FINITE BLASCHKE PRODUCTS

HIROYASU HAMADA
Kyushu University

Date: *Thursday, June* 17^{th} Time: *4:00pm–4:20pm* Room: *Sturm 453*

ABSTRACT: The talk is based on joint work with Y. Watatani. Let R be a finite Blaschke product of degree at least two such that its Julia set J_R is the unit circle $\mathbb{T}$. Then there exists a relation between the associated composition operator C_R on the Hardy space and the C^*-algebra $\mathcal{O}_R(J_R)$ associated with the complex dynamical system $(R^{\circ n})_n$ on J_R. In this talk we consider the C^*-algebra $\mathcal{TC}_R$ generated by both the composition operator C_R and the Toeplitz operator T_z. We show that the quotient algebra by the ideal of the compact operators is isomorphic to the C^*-algebra $\mathcal{O}_R(J_R)$, which is simple and purely infinite.

STRENGTH OF CONVERGENCE IN THE ORBIT SPACE OF A GROUPOID

ROBERT HAZLEWOOD
University of New South Wales, Australia

Date: *Thursday, June* 17^{th} Time: *2:10pm–2:30pm* Room: *Sturm 451*

ABSTRACT: Upper and lower multiplicity numbers for irreducible representations of C^*-algebras were introduced by Archbold in 1994. In 2006, Archbold and an Huef showed that, for a C^*-algebra associated to a free transformation group, the multiplicities of the irreducible representations correspond to the level of k-times convergence in the orbit space of the transformation group, as introduced by Archbold and Deicke in 2005. In this talk we discuss the generalisation of these results to the C^*-algebras of principal groupoids. The new level of generality is justified by a large class of examples based on groupoids constructed from directed graphs. This is joint work with Astrid an Huef (University of Otago, New Zealand).

MORITA EQUIVALENCE FOR FELL BUNDLE C*-ALGEBRAS

MARIUS IONESCU
University of Connecticut

Date: *Tuesday, June* 15^{th} Time: *11:45am–12:15pm* Room: *Sturm 451*

ABSTRACT: In this talk we present how to extend a classic Morita Equivalence Result of Green's to the C^*-algebras of Fell bundles over transitive groupoids. Specifically, we show that if $p : \mathcal{B} \to G$ is a saturated Fell bundle over a transitive groupoid G with stability group $H = G(u)$ at $u \in G^{(0)}$, then $C^*(G, \mathcal{B})$ is Morita equivalent to $C^*(H, \mathcal{C})$, where $\mathcal{C} = \mathcal{B}|_H$. Green's result is a special case of our application to bundles over groups. This talk is based on joint work with Dana P. Williams.

ON Q-POSITIVE MAPS AND RELATED RESULTS FOR E_0-SEMIGROUPS

CHRISTOPHER JANKOWSKI
Ben-Gurion University

Date: *Thursday, June* 17^{th} Time: *2:10pm–2:30pm* Room: *Sturm 454*

ABSTRACT: A linear map L acting on the complex $n \times n$ matrices is said to be q-positive if L has no negative eigenvalues and $L(I + tL)^{-1}$ is completely positive for all nonnegative t. The class of q-positive maps has recently played a role in constructing E_0-semigroups of type II and index zero. We give a classification of the unital q-positive maps acting on the 2×2 matrices and discuss results regarding the 3×3 case. We also present new cocycle conjugacy results for E_0-semigroups induced by boundary weight doubles.

DERIVATIONS CHARACTERIZED BY ACTION ON ZERO PRODUCTS

WU JING
Fayetteville State University

Date: *Thursday, June* 17^{th} Time: *2:10pm–2:30pm* Room: *Sturm 453*

ABSTRACT: In this talk we will discuss derivations on operator algebras that can be characterized by their action on zero products.

THE HEISENBERG - VON NEUMANN PUZZLE

RICHARD KADISON
University of Pennsylvania

Date: *Monday, June* 14^{th} Time: *11:45am–12:15pm* Room: *Sturm 451*

ABSTRACT: This talk will be the first of two (brief) talks. The first talk (by R. Kadison), will discuss the Heisenberg relation, $QP - PQ = \frac{-ih}{2\pi} I$, from the point of view of quantum mechanics, and the attempt to place it in a mathematical framework. We shall study when this can't be done, can be done, and whether it can or can't be done in a sophisticated mathematical framework created by Murray and von Neumann. In the second talk, Zhe Liu will "close the noose." (See her abstract for more.)

BEURLING-TYPE THEOREM ON ARBITRARY HILBERT SPACES

YUN-SU KIM
University of Toledo

Date: *Thursday, June* 17th Time: *3:30pm–3:50pm* Room: *Sturm 453*

ABSTRACT: We provide a Beurling-type theorem for an operator which is one-to-one and defined on an arbitrary Hilbert space.

HAUSDORFF MEASURES AND KMS STATES

ALEX KUMJIAN
University of Nevada, Reno

Date: *Tuesday, June* 15th Time: *2:40pm–3:00pm* Room: *Sturm 451*

ABSTRACT: Given a compact metric space X and a local homeomorphism $T : X \to X$ satisfying a local scaling property, we show that the Hausdorff measure on X gives rise to a KMS state on the C^*-algebra naturally associated to the pair (X, T) such that the inverse temperature coincides with the Hausdorff dimension. We prove that the KMS state is unique under some mild hypothesis. We use our results to describe KMS states on Cuntz algebras, graph algebras, and C^*-algebras on fractafolds.
This is joint work with Marius Ionescu.

BACK TO BASICS: ANOTHER LOOK AT MORITA EQUIVALENCE.

MAGNUS LANDSTAD
Norwegian University of Science and Technology

Date: *Thursday, June* 17th Time: *10:30am–11:30am* Room: *Sturm 451*

ABSTRACT: One of the basic forms of Morita equivalence is the following: If p is a projection in a *-algebra A, then the subalgebra pAp is Morita equivalent to the ideal ApA. We shall study various examples of this, we will need both the Fell and the Rieffel version of Morita equivalence, pass through old subjects like spherical functions and hermittian *-algebras. We will end with seeing how this perspective gives insight in the Hecke algebras of Bost-Connes and the C^*-algebras of integral domains studied by Cuntz-Li.

OPERATOR VALUED MEASURES, MAPPINGS BETWEEN VON NEUMANN ALGEBRAS, AND FRAME THEORY

DAVE LARSON
Texas A&M

Date: *Tuesday, June* 15^{th} Time: *2:10pm–2:30pm* Room: *Sturm 451*

ABSTRACT: We show that there are some natural associations between the theory of frames (including continuous frames and framings), the theory of operator-valued measures on sigma-algebras of sets, and the theory of ultraweakly continous linear mappings between von Neumann algebras. In this connection frame theory itself is identified with the special case in which the domain algebra for the mapping is commutative. Some of our results and proofs for mappings in this case extend naturally to cases where the domain algebra is non-commutative. Thus there is some justification for defining a noncommutative frame to be an arbitrary unital ultraweakly continuous linear mapping between von Neumann algebras. It has been known for a long time that the condition for a unital bounded linear mapping between C*-algebras to have a Hilbert space dilation to a bounded homomorphism is that the mapping needs to be completely bounded. Our theory shows that if the mapping is ultraweakly continous, then even if it is not completely bounded it still has a Banach space dilation to a homomorphism, and the Banach space can be rather nice. This is a generalization of the known result that arbitrary framings have Banach dilations. This is joint work with Deguang Han, Rui Liu and Bei Liu.

TOEPLITZ OPERATORS ON HARMONIC BERGMAN SPACES

TRIEU LE
University of Toledo

Date: *Thursday, June* 17^{th} Time: *2:40pm–3:00pm* Room: *Sturm 453*

ABSTRACT: Let ν be a rotation-invariant probability Borel measure on the unit ball in $\mathbb{R}^n$ ($n \geq 2$) such that the measure of $\{x : r < |x| < 1\}$ is always positive for $0 < r < 1$. The harmonic Bergman space b^2_ν consists of all harmonic functions that are square integrable with respect to ν. We show that for any uniformly continuous function f on the ball, the Toeplitz operator T_f is compact on b^2_ν if and only if f vanishes on the unit sphere. Using this result, we then show that the algebra generated by all Toeplitz operators with uniformly continuous symbols is an extension of the compact operators by $C(\mathbb{S})$, the space of continuous functions on the unit sphere.

THE VON NEUMANN - HEISENBERG PUZZLE

ZHE LIU
University of New Hampshire

Date: *Monday, June* 14th Time: *2:10pm–2:30pm* Room: *Sturm 451*

ABSTRACT: In the second talk on this topic, we study the representation of the basic Heisenberg relation by unbounded operators on a Hilbert space with special attention to the domains of those operators. We consider, first, the classic representation, with emphasis on the differentiation operator on the real line. We discuss its meaning and domain and special cores. We introduce approximation by special polynomials for these purposes. We then move to the question of representing the relation in the way von Neumann had wanted.

ALMOST COMMUTING MATRICES WITH REALITY CONSTRAINTS IN CONDENSED MATTER PHYSICS

TERRY LORING
University of New Mexico

Date: *Tuesday, June* 15th Time: *3:30pm–3:50pm* Room: *Sturm 454*

ABSTRACT: Almost commuting matrices arise naturally way in lattice models of topological insulators. Symmetries often force the matrices involved to live in finite-dimensional "real" C∗-algebras. An important case is that of almost commuting self-dual, unitary matrices. Self-duality here refers to the operation on 2N-by-2N complex matrices

$$\begin{bmatrix} A & B \\ C & D \end{bmatrix}^\sharp = \begin{bmatrix} D^T & -B^T \\ -C^T & A^T \end{bmatrix}.$$

In joint work with Matt Hastings, we find almost commuting self-dual, unitary matrices that are close to commuting unitary matrices, but not close to commuting self-dual, unitary matrices. The invariant that detects this is based on real K-theory, but can be described in terms of Pfaffians and so can be computed effectively in the context of numerical models.

PROJECTIONS IN ROTATION ALGEBRAS

FRANZ LUEF
UC Berkeley

Date: *Monday, June* 14th Time: *4:00pm–4:20pm* Room: *Sturm 453*

ABSTRACT: In my talk I want to approach Rieffel's projections in rotation algebras from the point of view of time-frequency analysis. In particular I show that Walnut's representation of Gabor frame operators and Wiener amalgam spaces appear naturally in Rieffel's construction.

THE DISCRETE FOURIER-RICCATI-BESSEL TRANSFORM FOR ROBIN BOUNDARY CONDITIONS

KEVIN MANLEY
University of Colorado, Boulder

Date: *Thursday, June* 17th Time: *4:30pm–4:50pm* Room: *Sturm 454*

ABSTRACT: In this talk, we will generalize the discrete Fourier-Ricatti-Bessel transform, allowing, via choice of several appropriate parameters, the recovery of the discrete Fourier sine transform, the discrete Hankel transform, and the discrete Fourier-Ricatti-Bessel transform for all three classes of boundary conditions, and the associated asymptotic inversion formulas. We then numerically and analytically estimate the error in our discrete inversion formula, finding that the error decreases as the cube of the size of the transform matrix. Finally, we apply our new transform to selected functions for which the continuous transform is known, compute the discrete backward transform, and asymptotically recover the original function.

A CONTINUOUS FOURIER ALGEBRA FOR A LOCALLY COMPACT GROUPOID

LAURA MARTI PEREZ
University of Waterloo

Date: *Tuesday, June* 15th Time: *3:30pm–3:50pm* Room: *Sturm 453*

ABSTRACT: For a locally compact groupoid, we define a continuous Fourier algebra. If the groupoid is transitive and locally trivial, the Haagerup tensor product help us understand its metrical structure.

FUNDAMENTAL GROUP OF SIMPLE C^*-ALGEBRAS WITH UNIQUE TRACE

NORIO NAWATA
Kyushu University

Date: *Monday, June* 14^{th} Time: *4:00pm–4:20pm* Room: *Sturm 451*

ABSTRACT: Let M be a factor of type II_1 with a normalized trace τ. Murray and von Neumann introduced the fundamental group $\mathcal{F}(M)$ of M. We introduce the fundamental group $\mathcal{F}(A)$ of a unital simple C^*-algebra A with a unique normalized trace. Our study is essentially based on the computation of Picard groups by Kodaka. We compute fundamental groups $\mathcal{F}(A)$ of several C^*-algebras A by K-theoretical obstruction. This result will be published in Adv. Math., 2010. Furthermore we show that any countable subgroup of the multiplicative group $\mathbb{R}_+^\times$ of positive real numbers can be realized as the fundamental group $\mathcal{F}(A)$ of a separable simple unital C^*-algebra A with unique trace. This is a joint work with Y. Watatani.

ON PURELY INFINITE CORONA ALGEBRAS

PING WONG NG
University of Louisiana at Lafayette

Date: *Tuesday, June* 15^{th} Time: *4:30pm–4:50pm* Room: *Sturm 451*

ABSTRACT: For a unital separable simple exact Z-stable C*-algebra A, we show that the corona algebra $M(A \otimes K)/(A \otimes K)$ is purely infinite in the sense of Kirchberg and Rordam if and only if A has at most finitely many extreme tracial states.
The above is joint work with Kucerovsky and Perera.

NONCOMMUTATIVE LOCALIZATION

IGOR NIKOLAEV
The Fields Institute

Date: *Thursday, June* 17^{th} Time: *4:00pm–4:20pm* Room: *Sturm 454*

ABSTRACT: It was noticed long ago, that the two-dimensional noncommutative tori correspond to the non-singular elliptic curves, defined over the field of complex numbers. What is a C*-algebra behind the elliptic curves over the field of characteristic p? An answer to the question is sketched; roughly, it is shown, that the Cuntz-Krieger algebras are what one needs in this case.

DERIVABLE MAPPINGS AND DERIVATIONS

Z. PATRICK PAN
Saginaw Valley State University

Date: *Monday, June* 14^{th} Time: *4:30pm–4:50pm* Room: *Sturm 454*

ABSTRACT: A linear mapping δ from an algebra $\mathcal{A}$ to an $\mathcal{A}$-bimodule $\mathcal{M}$ is called derivable at a fixed element $c \in \mathcal{A}$ if $\delta(ab) = \delta(a)b + a\delta(b)$ for all $a, b \in \mathcal{A}$ satisfying $ab = c$. Clearly, a derivation from $\mathcal{A}$ to $\mathcal{M}$ is derivable at every element $c \in \mathcal{A}$. Interestingly, for many subalgebras $\mathcal{A} \subseteq B(H)$ and any linear mapping δ from $\mathcal{A}$ to $B(H)$, derivability of δ at some single element implies δ is a derivation. Some recent joint work with Jiankui Li will be reported.

OBSTRUCTIONS TO A GENERAL CHARACTERIZATION OF GRAPH CORRESPONDENCES

NURA PATANI
Arizona State University

Date: *Tuesday, June* 15^{th} Time: *4:00pm–4:20pm* Room: *Sturm 453*

ABSTRACT: Let V be a locally compact Hausdorff space. When V is discrete, we have shown that every nondegenerate separable C*- correspondence over $c_0(V)$ is isomorphic to one coming from a directed graph with vertex set V. In this talk we demonstrate why the analogous characterizations for topological graphs and higher-rank graphs fail to hold and discuss the obstructions that arise, along with several interesting results.

A TOPOLOGICAL EQUIVARIANT K-THEORY FOR GROUPOIDS

ALAN PATERSON
University of Colorado, Boulder

Date: *Monday, June* 14^{th} Time: *2:40pm–3:00pm* Room: *Sturm 451*

ABSTRACT: Graeme Segal defined equivariant topological K-theory $K_G(X)$ for a compact group G in terms of G-vector bundles over X. A remarkable result, due to Green and Rosenberg, identifies this $K_G(X)$ with the analytic K-theory group $K(C^*(G,X))$, where $C^*(G,X)$ is the crossed product C^*-algebra. However, to get extra structure on $K_G(X)$, e.g. the ring structure, we need to use the topological K-theory. The theorem was extended to the case of non-compact G acting properly on an X by Chris Phillips in his book "Equivariant K-theory for proper actions", and required substantially different techniques. For example, one has to use G-Hilbert bundles in place of G-vector bundles, pointwise G-Fredholm operators, and Kasparov's KK-theory. For applications in noncommutative geometry, one requires a corresponding equivariant topological K-theory for proper groupoids that should be equal to the K-theory of the groupoid C*-algebra. (The groupoid in the Phillips case is just the transformation groupoid $G \times X$.) We state such a theorem, and indicate one of the main technical problems that has to be dealt with. This is that for the groupoid Hilbert bundles involved, the topology is neither locally compact nor locally trivial: instead the bundles are topological bundles in the sense of Fell and Doran.

TENSOR PRODUCTS OF OPERATOR SYSTEMS

VERN PAULSEN
University of Houston

Date: *Friday, June* 18^{th} Time: *9am–10am* Room: *Sturm 451*

ABSTRACT: In joint work with A. Kavruk, I. Todorov and M. Tomforde, we have begun a systematic study of tensor products of operator systems. Although there are many parallels with the theory of tensor products of operator spaces, there are also many differences and some advantages. For example, for pairs of C*-algebras, their maximal tensor product in the category of operator systems is the same as their maximal C*-tensor product, unlike their maximal tensor product as operator spaces.
On the other hand, we show that there exist operator systems S such that $S \otimes_{min} A = S \otimes_{max} A$ for every C*-algebra A, yet S is not completely order isomorphic to a C*-algebra. We also exhibit an operator system S such that for any pair of unital C*-algebras $A \subseteq B$, every completely positive map from A into S extends to a completely positive map of B into S, yet S is not completely order isomorphic to an injective C*-algebra.

TYPE III E_0-SEMIGROUPS, OR "WHERE HAVE ALL THE UNITS GONE?"

ROBERT POWERS
University of Pennsylvania

Date: *Friday, June* 18th Time: *10:30am–11:30am* Room: *Sturm 451*

ABSTRACT: The talk concerns an example of a one parameter semigroup of *-automorphisms of $B(H)$ that has no intertwining semigroup of isometries. Recently Izumi and Srinivasan have shown that the example of I constructed twenty years ago can be modified to give a one parameter family of non cocycle conjugate E_0-semigroups. These examples and preliminary results about their gauge groups is disscussed.

C*-ALGEBRAS ASSOCIATED WITH PROJECTION METHOD TILINGS

IAN PUTNAM
University of Victoria

Date: *Monday, June* 14th Time: *9am–10am* Room: *Sturm 451*

ABSTRACT: I will first give a brief overview of aperiodic tilings, such as the Penrose tilings and then discuss the construction of examples by the projection method. I will discuss the associated C*-algebras, including aspects of the K-theory and their KK-theory.

MULTIPLIER BIMODULES AND CUNTZ-PIMSNER ALGEBRAS

JOHN QUIGG
Arizona State University

Date: *Tuesday, June* 15th Time: *4:00pm–4:20pm* Room: *Sturm 451*

ABSTRACT: We describe how multipliers of C*-correspondences can be used to construct homomorphisms of Cuntz-Pimsner algebras. We apply this to the construction of a homomorphism from C*(E/G) to M(C*(E)) when G is a group acting freely and properly on a toplogical graph E. We show that the image is Rieffel's generalized fixed-point algebra, and deduce that C*(E/G) is Morita equivalent to the crossed product of C*(E) by G.
Joint with V. Deaconu and A. Kumjian.

A LOWER BOUND FOR THE SPECTRAL RADIUS OF RANDOM WALKS ON THE BAUMSLAG SOLITAR GROUP.

DANIEL REDELMEIER
Texas A&M University

Date: *Tuesday, June* 15th Time: *4:00pm–4:20pm* Room: *Sturm 454*

ABSTRACT: The spectral radius of random walks on the Caley graph of groups capture the asymptotics of the return probability of the group. Here we investigate the spectral radius of the Baumslag Solitar group, a group famous for its use it counterexamples. In order to do this we note that the Baumslag Solitar Group is an HNN extension of the integers. This allows us to use the C* HNN extension of Ueda to write its C* algebra in terms of an amalgamated free product, and use free probability techniques. From there we find a coefficient lower bound for the moment generating series. Using numerical methods we use this to find a lower bound for the spectral radius of the random walk

FLUCTUATIONS OF RANDOM MATRICES AND REAL SECOND-ORDER FREENESS

EMILY REDELMEIER
Queen's University

Date: *Friday, June* 18th Time: *11:45am–12:15pm* Room: *Sturm 451*

ABSTRACT: I will discuss the fluctuations of the moments of random matrices around their large-matrix limits. I will examine the properties of some real matrix ensembles (Wishart, GOE, Haar-distributed orthogonal) and propose a definition of asymptotic second-order freeness satisfied by independent ensembles in these cases. This motivates a definition of second-order freeness of real operator spaces, distinct from the complex definition.

SPECTRAL TRIPLES FOR CROSSED PRODUCTS

KAMRAN REIHANI
University of Kansas

Date: *Thursday, June* 17^{th} Time: *4:30pm–4:50pm* Room: *Sturm 451*

ABSTRACT: In this talk, we will consider the following general problem: Given a spectral triple for a C^*-algebra $\mathcal{A}$ and an action of a (discrete) group Γ of automorphisms of A, how can we construct a spectral triple for the crossed product $A \rtimes \Gamma$? We propose a solution for the case $\Gamma = \mathbb{Z}$ under some conditions on the single automorphism, and we show those conditions are related to almost periodicity. For other cases that the action does not satisfy the conditions, we propose another solution following the idea of Connes and Moscovici about "Diffeomorphism-Invariant Geometries".

This is based on an ongoing project with Jean Bellissard and Matilde Marcolli.

BEST APPROXIMATION FROM C*-SUBALGEBRAS

MARC RIEFFEL
University of California at Berkeley

Date: *Thursday, June* 17^{th} Time: *9am–10am* Room: *Sturm 451*

ABSTRACT: Let A be a unital C*-algebra, and let B be a unital C*- subalgebra of A. My study of C*-metrics has recently led me to explore the properties of the closest approximation to an element of A by elements of B. To my surprise I find very little written about this specific topic, in spite of the enormous existing literature about best approximation to elements of a Banach space by elements of a closed linear subspace. I have found that there is interesting structure here that is special to the case of C*-algebras. My study of this topic is on-going, and I will report on what I have found by the time of our meeting. I would be very happy to have brought to my attention any literature about this specific topic.

THE CLOSEABILITY PROPERTY FOR ALGEBRAS OF BOUNDED LINEAR OPERATORS ON A COMPLEX BANACH SPACE

HASKELL P. ROSENTHAL

University of Texas, Austin

Date: *Monday, June* 14th Time: *3:30pm–3:50pm* Room: *Sturm 454*

ABSTRACT: Let A be an algebra of bounded linear operators on a complex Banach space X. A is said to have the *closeability property* (cp) if every densely defined linear operator which commutes with A is closeable. A bounded linear operator T on X is said to have the cp if the strong closure of the algebra of polynomials in T has the cp. We shall discuss progress on the following two conjectures. (Some of the progress is in joint work with T. Oikhberg and V. Troitsky.)

CONJECTURE 1. *Let A have the cp. Then either A has a nontrivial invariant subspace, or A is strongly dense in $L(X)$.*

(An invariant subspace of A is called nontrivial if it is closed, linear non-zero, and not all of $L(X)$.) Note that if this conjecture holds, then every bounded linear operator on X with the cp has nontrivial hyperinvariant subspaces. In a remarkable seminal paper in the 60's, W. Arveson proved that if $X = H$, separable infinite dimensional Hilbert space, then if A contains a MASA or if A contains the unilateral shift, A satisfies the conclusion of Conjecture 1. Arveson also established that MASA's and the unilateral shift both have the cp (although he didn't use this terminology). Recently, answering a question of mine, Bercovici, Douglas, Foias and Percy, in joint work, showed that the bilateral shift fails the cp.

CONJECTURE 2. *There exists a strongly closed proper subalgebra of $L(H)$ containing the bilateral shift which has no non-trivial invariant subspaces.*

Of course an affirmative answer to this conjecture solves the famous transitive algebras problem, posed by R. Kadison in the 50's.

ORBIT EQUIVALENCE FOR MINIMAL ACTIONS OF FINITELY GENERATED ABELIAN GROUPS ON THE CANTOR SET.

CHRISTIAN SKAU

Norwegian University of Science and Technology

Date: *Tuesday, June* 15th Time: *9am–10am* Room: *Sturm 451*

ABSTRACT: Let G be a countable group acting minimally(i.e. all orbits are dense) on the compact metric space X, denoted (X, G). We say that (X, G) is (topologically) orbit equivalent to (Y, H) if there exists a homeomorphism F from X to Y which maps the G-orbit of x onto the H-orbit of $F(x)$ for every x in X.If X (and hence Y) is a connected space, orbit equivalence implies isomorphism of the dynamical systems (X, G) and (Y, H),and hence the study of orbit structure is uninteresting in this case. However,if X (and hence Y) is a Cantor set we get an abundance of non-isomorphic systems in each orbit equivalence class. We will show that if G is a finitely generated abelian group,then the minimal Cantor system (X, G) is orbit equivalent to (X, Z) for some action of the integers Z .We will also show that a complete invariant for orbit equivalence is a simple dimension group with trivial infinitesimal subgroup. (This is joint work with Giordano,Matui and Putnam.)

ESTIMATES FOR MULTIPLE OPERATOR INTEGRALS.

ANNA SKRIPKA
Texas A&M University

Date: *Monday, June* 14^{th} Time: *4:00pm–4:20pm* Room: *Sturm 454*

ABSTRACT: We obtain new estimates for multiple operator integrals and apply them to resolve Koplienko's conjecture of 1984 on existence of higher order spectral shift functions.
The talk is based on joint work with D. Potapov and F. Sukochev.

THE RELATIVE WEAK ASYMPTOTIC HOMOMORPHISM PROPERTY FOR INCLUSIONS OF FINITE VON NEUMANN ALGEBRAS

ROGER SMITH
Texas A&M

Date: *Monday, June* 14^{th} Time: *4:30pm–4:50pm* Room: *Sturm 451*

ABSTRACT: For an inclusion $B \subseteq M$ of finite von Neumann algebras, the group of unitary normalizers is defined by

$$\mathcal{N}_M(B) = \{u \in \mathcal{U}(M) : uBu^* = B\}.$$

This was first studied by Dixmier in the 1950's in the context of maximal abelian subalgebras (masas), and he defined B to be singular if $\mathcal{N}(B)'' = B$. In joint work with Robertson and Sinclair, we introduced the *weak asymptotic homomorphism property* (WAHP) as an easy-to-use sufficient criterion for singularity, subsequently shown to also be necessary by Sinclair, White, Wiggins and the speaker for masas (but not more generally, Grossman and Wiggins). This was then generalized by Chifan to a relative form (RWAHP) for a triple $B \subseteq N \subseteq M$, equivalent to the former when $N = B$. We give a characterization of the RWAHP in terms of certain operators in M called one sided quasi-normalizers. Using this, we are able to obtain some new results on inclusions $L(H) \subseteq L(G)$ arising from group inclusions $H \subseteq G$. For example, when H is abelian and generates a masa in $L(G)$, we obtain

$$\mathcal{N}_{L(G)}(L(H))'' = L(\mathcal{N}_G(H))'',$$

so that normalizers at the von Neumann level are directly related to normalizers at the more basic group level.
This is joint work with Junsheng Fang and Mingchu Gao.

FRAMES AND THEIR ASSOCIATED H_F^p-SUBSPACES

WAI-SHING TANG
National University of Singapore

Date: *Tuesday, June* 15^{th} Time: *4:30pm–4:50pm* Room: *Sturm 453*

ABSTRACT: Given a frame $F = \{f_j\}$ for a separable Hilbert space H, we introduce the linear subspace H_F^p of H consisting of elements whose frame coefficient sequences belong to the ℓ^p-space, where $1 \leq p < 2$. Our focus is on the general theory of these spaces, and we investigate different aspects of these spaces in relation to reconstructions, p-frames, realizations and dilations. In particular we show that for closed linear subspaces of H, only finitely dimensional ones can be realized as H_F^p-spaces for some frame F. We also show that with a mild decay condition on the frame F, the frame expansion of any element in H_F^p converges in both the Hilbert space norm and the $\|\cdot\|_{F,p}$-norm which is induced by the ℓ^p-norm. This is joint work with Deguang Han and Pengtong Li.

COVARIANT REPRESENTATIONS OF SUBPRODUCT SYSTEMS

AMI VISELTER
Technion-Israel Institute of Technology

Date: *Thursday, June* 17^{th} Time: *4:00pm–4:20pm* Room: *Sturm 451*

ABSTRACT: A celebrated theorem of Pimsner states that a covariant representation T of a C^*-correspondence E extends to a C^*-representation of the Toeplitz algebra of E if and only if T is isometric. We are concerned with finding conditions for a covariant representation of a *subproduct system* to extend to a C^*-representation of the Toeplitz algebra. This framework is much more general than the former. We are able to find sufficient conditions, and show that in important special cases, they are also necessary. Further results include the universality of the tensor algebra, dilations of completely contractive covariant representations, Wold decompositions and von Neumann inequalities.

LIFTING MODULE MAPS OVER DIFFERENT NONCOMMUTATIVE DOMAIN ALGEBRAS

JONATHAN VON STROH
University of Denver

Date: *Thursday, June* 17^{th} Time: *2:40pm–3:00pm* Room: *Sturm 454*

ABSTRACT: Noncommutative domain algebras were recently introduced by Popescu as the non-selfadjoint operator algebras generated by weighted shifts on the Full Fock space. These algebras are indexed by what Popescu called positive free holomorphic functions. For example, the positive free holomorphic function $f = X_1 + \cdots + X_n$ leads to the left creation operators on the Full Fock space; and the positive free holomorphic function $g = X_1 + X_2 + X_1X_2$ leads to the domain algebra which is the model for operators satisfying $T_1T_1^* + T_2T_2^* + T_1T_2T_2^*T_1^* \leq I$.

In this talk we will use Hilbert module language similar to that of Douglas and Paulsen and Muhly and Solel and a renorming technique to lift module maps between $*$-invariant subspaces of different domain algebras.

STRONG SINGULARITY CONSTANTS FOR TYPE II_1 SUBFACTOR INCLUSIONS

ALAN WIGGINS
University of Michigan-Dearborn

Date: *Tuesday, June* 15^{th} Time: *2:40pm–3:00pm* Room: *Sturm 453*

ABSTRACT: A unital subalgebra B of a II_1 factor M is said to be α-strongly singular if there is a constant $0 < \alpha \leq 1$ such that for all unitaries $u \in M$,

$$\alpha \cdot \|u - \mathbb{E}_B(u)\|_2 \leq \|\mathbb{E}_B - \mathbb{E}_{uBu^*}\|_{\infty,2}.$$

This notion was introduced by Sinclair and Smith and immediately implies that the subalgebra B is singular, i.e., has no nontrivial normalizing unitaries. As a consequence of Popa's Intertwining Theorem, any singular masa is α-strongly singular with $\alpha = 1$. In joint work with Pinhas Grossman, we showed that there exists a finite index subfactor of the hyperfinite II_1 factor that is no less that $\sqrt{\sqrt{2}(\sqrt{2}-1)}$-strongly singular and no more than $\sqrt{2(\sqrt{2}-1)}$-strongly singular. We shall extend lower bounds for strong singularity constants to a larger class of subfactors, give potential additional counterexamples to $\alpha = 1$ in the subfactor case, and, time permitting, vacillate about infinite index inclusions.

GROUP ACTIONS ON THE C^*-ALGEBRAS OF LABELED GRAPH

PAULETTE WILLIS
University of Iowa

Date: *Wednesday, June* 16^{th} Time: *11:45am–12:15pm* Room: *Sturm 451*

ABSTRACT: A *labeled graph* $(E, \mathcal{L})$ over an alphabet $\mathcal{A}$ consists of a directed graph E together with a labeling map $\mathcal{L} : E^1 \to \mathcal{A}$. One can associate a C^*-algebra to a labeled graph $(E, \mathcal{L})$ in such a way that if the labeling $\mathcal{L}$ is trivial then the resulting C^*-algebra is the C^*-algebra of the graph E.
In this presentation, I will discuss joint work with Teresa Bates and David Pask concerning (discrete) group actions on labeled graphs and the resulting crossed product C^*-algebras. In particular, I will discuss our main theorem which shows that the crossed product that arises when a group acts freely on a labeled graph is strongly Morita equivalent to the C^*-algebra of the quotient graph of the action. I will focus on the two major ideas needed to prove this Morita equivalence. The first is a generalization of the so-called Gross-Tucker theorem, which shows that a free labeled graph action is naturally equivariantly isomorphic to a *skew product* action obtained from the quotient labeled graph. The second is a generalization of a theorem of Kaliszewski, Quigg, and Raeburn to the effect that the C^*-algebra of a skew product labeled graph is naturally isomorphic to a co-crossed product of a coaction of the group on the C^*-algebra of the labeled graph.

APERIODICITY IN TOPOLOGICAL k-GRAPHS

SARAH WRIGHT
Dartmouth College

Date: *Monday, June* 14^{th} Time: *4:30pm–4:50pm* Room: *Sturm 453*

ABSTRACT: The condition "every cycle has an entry" first appeared in the literature in Kumjian, Pask, and Raeburn's paper on Cuntz-Krieger algebras of directed graphs, where it was called Condition (L). It provides a necessary condition for simplicity of the associated graph algebra. This condition has been generalized to aperiodicity conditions in the theory of topological graphs (Katsura), k-graphs (Kumjian, Pask), and the unifying theory of topological k-graphs (Yeend). We'll discuss the details of these generalizations as well as the theorems associated with them. We'll then introduce a Condition (F) on the finite paths of a topological k-graph that is equivalent to the corresponding aperiodicity condition. Hence we obtain a condition which is much easier to check than the aperiodicity of infinite paths.

C-ORBIT REFLEXIVE OPERATORS

HASSAN YOUSEFI

California State University, Fullerton

Date: *Monday, June* 14th Time: *2:10pm–2:30pm* Room: *Sturm 453*

ABSTRACT: We introduce the notion of C-orbit reflexivity and study its properties. An operator on a finite-dimensional space is C-orbit reflexive if and only if the two largest blocks in its Jordan form corresponding to nonzero eigenvalues with the largest modulus differ in size by at most one. Most of the proofs of our results in infinite dimensions are obtained from purely algebraic results we obtain from linear-algebraic analogs of C-orbit reflexivity.

CHAPTER 6

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