West Coast Operator Algebras Seminar 2005
September 15–17, 2005

MEALS

Breakfast (Continental): 7:00–9:00 am, 2nd floor lounge, Corbett Hall, Friday & Saturday (*included in workshop*)
Lunch (Buffet): 11:30 am–1:30 pm, Donald Cameron Hall (*Cost: $12.50 + tax*)
Dinner (Buffet): 5:30–7:30 pm, Donald Cameron Hall (*Cost: $23 + tax*)
Coffee Breaks: As per daily schedule, 2nd floor lounge, Corbett Hall (*included in workshop*)
For other lighter meal options at the Banff Centre, there are two other options: Gooseberry's Deli, located in the Sally Borden Building, and The Kiln Cafe, located beside Donald Cameron Hall. There are also plenty of restaurants and cafes in the town of Banff, a 10–15 minute walk from Corbett Hall.

MEETING ROOMS

All lectures are held in Max Bell 159. Hours: 6 am–12 midnight. LCD projector, overhead projectors and blackboards are available for presentations *Please note that the meeting space designated for BIRS is the lower level of Max Bell, Rooms 155–159. Please respect that all other space has been contracted to other Banff Centre guests, including any Food and Beverage in those areas.*

SCHEDULE

Thursday

16:00	Check-in begins (Front Desk—Professional Development Centre—open 24 hours)

Friday

7:00–9:00	Breakfast, 2nd floor lounge, Corbett Hall
9:00–9:05	Opening Remarks
9:05–9:55	John Phillips, *A survey of the analytic approach to spectral flow with some applications*
10:05–10:30	Coffee Break, 2nd floor lounge, Corbett Hall
10:30–10:55	N. Christopher Phillips, *Realizing higher dimensional noncommutative toruses as C^*-algebras of homeomorphisms of one dimensional spaces*
11:00–11:25	Alex Kumijan, *On Hausdorff measures and KMS states*
11:30–1:30	Lunch
1:30–2:20	Edward G. Effros, *On the free analogues of Hopf algebras associated with the Faà di Bruno algebra, and the Connes–Kreimer theory*
2:30–2:55	Douglas R. Farenick, *Local multipliers and injective envelopes of C^*-algebras*
3:00–3:25	Kenneth Goodearl, *The range of the invariant $V(A)$ for inductive limits of Cuntz algebras*
3:30–4:00	Coffee Break, 2nd floor lounge, Corbett Hall

4:00–4:25 David Sherman, *Unitary orbits of normal operators in von Neumann algebras*

4:30–4:55 Hiroki Matui, *Affability of equivalence relations arising from two-dimensional substitution tilings*

5:00–5:25 Igor Nikolaev, *AF C^*-algebras and Riemann surfaces*

5:30–7:30 Dinner

Saturday

7:00–9:00 Breakfast, 2nd floor lounge, Corbett Hall

9:00–9:50 David Blecher, *Dual operator algebras and noncommutative H^∞*

10:00–10:30 Coffee break, 2nd floor lounge, Corbett Hall

10:30–10:55 Remus Floricel, *Infinite tensor products of product systems*

11:00–11:25 Ahmed Sourour, *Spectral isometries*

Checkout by 12 noon.

** 2-day workshops are welcome to use the BIRS facilities (2nd Floor Lounge, Max Bell Meeting Rooms, Reading Room) until 16:00 on Saturday, although participants are still required to checkout of the guest rooms by 12 noon. There is no coffee break on Saturday afternoon, but self-serve coffee and tea are always available in the 2nd floor lounge, Corbett Hall. **

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ABSTRACTS
(in alphabetic order by speaker surname)

Speaker: **David P. Blecher** (University of Houston)
Title: *Dual operator algebras and noncommutative H^∞*
Abstract: We first discuss some subtleties involved in the duality used in operator space theory, giving applications to operator algebras and modules. In the last part of the talk we discuss a particular class of dual operator algebras, namely Arveson's noncommutative H^∞. We present a list of very disparate looking characterizations of this algebra, and discuss subspaces of noncommutative L^p which are invariant for it, and noncommutative Beurling–Nevanlinna type factorizations. (Joint work with Bojan Magajna or Louis Labuschagne).

Speaker: **Edward G. Effros** (University of California, Los Angeles)
Title: *On the free analogues of Hopf algebras associated with the Faà di Bruno algebra, and the Connes–Kreimer theory*
Abstract: We will review how combinatorial objects and their Hopf algebras may be used to systematize analytic computations. These include using trees to invert power series (Lagrange–Faà di Fruno–Rota–Haiman–Schmidtt) and to index computations in renomalization (the Feynman–Kreimer–Connes theory).

An elegant "free" version of the Connes–Kreimer theory has been formulated by Foissy. As Brouder and others have pointed out, this should be of relevance to non-scalar renormalization. On the other hand, the possibility of finding a free version of the Rota–Haiman–Schmitt theory had not been pursued. This may be in part due to the realization that composition of power series in non-commuting variables and coefficients are not associative under composition.

We show that, nevertheless, there is a free analogue of the Faà die Bruno algebra, and despite the fact that it is associative, the antipode still determines the compositional inverses of non-associative power series in many variables. We have also shown that the key "Zimmermann cancellations" that occur in the Haiman–Schmitt theory of the antipode have a surprising non-commutative analogue.

This is joint work with M. Anshelevich and M. Popa.

Speaker: **Douglas R. Farenick** (University of Regina)
Title: *Local multipliers and injective envelopes of C^*-algebras*
Abstract: The notion of the injective envelope was developed by Hamana in the later 1970s and early 1980s, and it has had a number of applications in operator algebra and operator space theory since then. During the 1990s, Ara and Mathieu undertook a systematic study of local mutlipler algebras of C^*-algebras. The present lecture describes some relationships between local multiplier algebras and injective envelopes; special emphasis is given to the cases where the injective envelope is of type I (as an AW^*-algebra). This lecture is based on joint work with Martin Argerami.

Speaker: **Remus Floricel** (UC Berkeley)
Title: *Infinite tensor products of product systems*
Abstract: We define the infinite tensor product of a family of product systems with respect to a family of normalized units and discuss the main properties of this construction.

Speaker: **Kenneth Goodearl** (University of California, Santa Barbara)
Title: *The range of the invariant $V(A)$ for inductive limits of Cuntz algebras*
Abstract: We describe precisely which abelian monoids appear as $V(A)$ (the monoid of Murray-von Neumann equivalence classes of projections in matrix algebras over A) for "Cuntz limits" A, i.e., inductive limits of sequences of finite direct products of matrix algebras over Cuntz algebras $\mathcal{O}_n$. The invariant $V(A)$ is equivalent, in the unital case, to the classifying invariant in Rørdam's classification of Cuntz limits, and it is one of the key ingredients of the classifying invariant in the non-unital case.

Our characterization of the monoids $V(A)$ for Cuntz limits A is given in terms of elementary algebraic conditions, two important ones being the Riesz refinement property and the condition that each element x has finite order, in the sense that $(n+1)x = x$ for some positive integer n. We also exhibit these monoids as submonoids of direct products $\Lambda \times G$ for semilattices Λ and torsion abelian groups G.

This is joint work with E. Pardo (Cádiz) and F. Wehrung (Caen).

Speaker: **Alex Kumijan** (University of Nevada, Reno)
Title: *On Hausdorff measures and KMS states*
Abstract: We explore an intriguing correspondence between Hausdorff measures arising from self-similar metrics on Cantor sets and KMS states on Cuntz algebras. This correspondence identifies the Hausdorff dimension of the space with the inverse temperature of the KMS state.

Speaker: **Hiroki Matui** (Chiba University)
Title: *Affability of equivalence relations arising from two-dimensional substitution tilings*
Abstract: We will show that equivalence relations on Cantor sets arising from two-dimensional substitution tilings are topologically orbit equivalent to AF relations.

Speaker: **Igor Nikolaev** (University of Calgary)
Title: *AF C^*-algebras and Riemann surfaces*
Abstract: For an open and dense subset in the Teichmüller space, we introduce a coordinate system which is (relatively) well-behaved under the action of the mapping class group. Surprisingly, the coordinates involve the set of projections and traces in a C^*-algebra. Our approach might be helpful for representation of the mapping class group, and other issues.

Speaker: **John Phillips** (University of Victoria)
Title: *A survey of the analytic approach to spectral flow with some applications*
Abstract: We consider the problem of spectral flow of continuous paths of (Breuer–)Fredholm operators in a general semifinite von Neumann algebra equipped with a fixed faithful normal semifinite trace. We give a general definition of spectral flow of such paths and explain why the definition is heuristically correct. We show how the concept comes up in the context of Connes' spectral triples and give analytic formulas for spectral flow in this setting. We briefly explain how these ideas lead to a new proof of the Connes–Moscovici local index theorem.

This is ongoing joint work with Alan Carey, Adam Rennie and Fyodor Sukochev and others. A recent preprint of an expository article written with these co-authors, Moulay Benameur, and Krzysztof Wojciechowski will be available.

Speaker: **N. Christopher Phillips** (University of Oregon)
Title: *Realizing higher dimensional noncommutative toruses as C^*-algebras of homeomorphisms of one dimensional spaces*
Abstract: We prove that many higher dimensional toruses can be realized as crossed products by minimal homeomorphisms of one dimensional spaces.

This is joint work with Benjamin Itza-Ortiz.

Speaker: **David Sherman** (UC Santa Barbara)
Title: *Unitary orbits of normal operators in von Neumann algebras*
Abstract: We give simple descriptions of the norm and strong* closures of the unitary orbit of a normal operator in a von Neumann algebra. The statements are in terms of spectral data and do not depend on the type or cardinality of the ambient algebra. As time permits, we survey some of the many predecessors and applications.

Speaker: **Ahmed Sourour** (University of Victoria)
Title: *Spectral isometries*
Abstract: A spectral isometry on a Banach algebra is a linear map that preserves the spectral radius. I will discuss multiplicative properties of spectral isometries on some operator algebras.