West Coast Operator Algebra
October 16-18, 2003

INFORMATION

1. **Nametags and Registration:** Nametags are found on the table in the lounge, 2nd floor of Corbett Hall; please pick up and return them in the black box provided. Please also sign the registration sheet/rooming list found in the binder on that same table.

2. **Meeting Rooms: All lectures will be held in Max Bell 159.** *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.*

3. **Meals:**

   Breakfast (Continental): 7:00 – 9:00 am, 2nd floor lounge, Corbett Hall, Friday & Saturday (covered by BIRS) – many breakfast items can be found in the fridge and cupboards
   *Lunch (Buffet): 11:30 am – 1:30 pm, Donald Cameron Hall, $12 + tax
   *Dinner (Buffet): 5:30 – 7:30 pm, Donald Cameron Hall, $22 + tax
   Coffee Breaks: As per daily schedule, 2nd floor lounge, Corbett Hall
   Lunch and dinner are not included in the workshop but can be charged to your room and paid upon checkout.

4. **BIRS Lounge:** 2nd Floor, Corbett Hall, Room 5210, keypad lock. The code for the keypad lock is sent to your e-mail address before the conference. If you have not brought this information with you, please check with BIRS staff or ask another workshop participant. Come and go as you please but please tidy up as you go (this room is NOT serviced 24 hours). There is a fridge stocked with refreshments (alcoholic and non-alcoholic) and snacks; payment is based on the honor system; prices are found where items are found; please make payment in the cash boxes on the counter.

5. **Computer Accounts:** Username for your BIRS computer account is sent to your e-mail address before the workshop. It can also be found in the binder on the table in the 2nd floor lounge. Please contact the System Administrator (Brent Kearney, ext. 6997 or brentk@pims.math.ca) for any questions regarding your computer account.

6. **Reading Room/Printer:** PC, printer (default), scanner, SunRay terminal, small library of math books - 3rd floor, Corbett Hall, Room 5310. Hours: 6 am – 12 midnight.

7. **Checkout on Saturday must be by noon at the latest.** Another group of 50 is checking in at BIRS on Saturday and all of the rooms must be serviced and ready for check-in by 4 pm. Participants are welcome to keep their luggage in the 2nd floor lounge in Corbett Hall or in storage at the front desk of The Banff Centre on Saturday after noon.

SCHEDULE

Thursday, October 16

Check-in at Professional Development Centre starting at 4:00pm.

Dinner Options: The Banff Centre Main Dining Room runs a dinner buffet from 5:30-7:30 pm. It costs $22 for BIRS participants and can be charged to individual room accounts.
There are also many restaurants in the town of Banff. Check out the "Dining in Banff & Lake Louise"; copies of this brochure are found in the BIRS lounge, 2nd floor Corbett Hall.

Following dinner, feel free to meet for an informal gathering in the BIRS 2nd floor Lounge in Corbett Hall (room 5210).

Friday October 17

9:00 – 9:45 Narutaka Ozawa, Solid von Neumann Algebras

10:00 – 10:20 Benjamin Itza-Ortiz, The order structure on K_0 of crossed products of the Mapping Torus

10:20 – 10:50 Coffee, 2nd floor lounge, Corbett Hall

10:50 – 11: 35 Frederic Latramoliere, Approximation of quantum tori by finite quantum tori for the quantum Gromov-Hausdorff distance

11:50 – 12:10 Byung-Jay Kahng, Non-tracial Haar weight on a quantum Heisenberg group

12:10 – 2:00 Lunch

2:00 – 2:45 Dimitri Shlyakhtenko, L^2-Betti numbers for von Neumann algebras (joint work with A. Connes)

3:00 – 3:20 Todd Kemp, Hypercontractivity in holomorphic Clifford algebras

3:20 – 3:50 Coffee, 2nd floor lounge, Corbett Hall

3:50 – 4:35 Ilan Hirschberg, Continuous counterparts of Pimsner-Topelitz algebras

4:50 – 5:10 Sarah Reznikoff, Hilbert Space representations of the annular Temperley-Lieb Algebra

5:15 – 5:35 Remus Floricel, A characterization of cocycle conjugate E_0 -semigroups in standard form

Saturday October 18

9:00 – 9:45 Bill Arveson, Freholm Dirac operators

10:00 – 10:20 Takeshi Katsura, What should crossed products be?

10:20 – 11:15 Coffee and checkout

11:15 – 12:00 Judith Packer, Projective multiresolution analyses for $L^2(\mathbb R^2)$.

Abstracts for 45 minute talks

Bill Arveson
Title: Fredholm Dirac Operators

Abstract: Every commuting d-tuple of operators acting on a Hilbert space has an associated Dirac operator D. D is a bounded self-adjoint operator that carries certain additional structure, and when
D is Fredholm, there is a numerical index associated with it. This index generalizes the Fredholm index of single Fredholm operators.
After reviewing these fundamentals, we use Dirac operators to describe an index formula for the curvature invariant of graded d-contractions. However, as it stands, that index formula is unstable because the associated Dirac operators are not known to be Fredholm. What is lacking here is an effective theory of Fredholmness in dimension greater than 1. We believe that these Dirac operators are Fredholm and that the C*-algebra generated by such a d-contraction is commutative modulo compact operators, but that remains an unsolved problem in general. We describe recent progress on this problem and discuss its connection with algebraic geometry.

Ilan Hirschberg
Title: Continuous counterparts of Pimsner-Topelitz algebras

Abstract:We consider a class of C*-algebras associated to continuous tensor product systems of Hilbert modules. Those generalize Arveson's spectral algebras, and can be viewed as a continuous analogue of Pimsner's Toeplitz algebras.
We will discuss analogues of Pimsner's theorem, which relates representations of a Hilbert module to representations of the Toeplitz algebra, and of Pimsner's 6 term exact sequence

generalizing the Pimsner-Voiculescu sequence (which in the continuous case, will be a generalization of Connes' analogue of the Thom isomorphism).
We shall also present a new proof of the universal property of the Pimsner-Toeplitz algebras (under a non-degeneracy assumption), which does not make use of the conditional expectation onto the fixed point algebra of the circle action.

Frederic Latremoliere
Title: Approximation of Quantum Tori by Finite Quantum Tori for the quantum Gromov-Hausdorff distance

Abstract:We propose a generalization to the quantum torus of the well-known
Convergence of the cyclic subgroups of the torus $\mathbb{T}^{d}$ to $\mathbb{T}^{d}$
For the Hausdorff distance, when one has chosen a length function on $\mathbb{T}^{d}$ and for any dimension d. More precisely, let $d\in\{2,3,\ldots\}$ and l a continuous length function on $\mathbb{T}^{d}$. Let G be a quotient subgroup of $\mathbb{Z}^{d}$. Its dual $\widehat{G}$ can Be viewed as a subgroup of $\mathbb{T}^{d}.$ As such it inherits a length function from l. Now, this length function and the dual action of $\widehat{G}$ on G allows us to define a Lip-norm on $C^{\ast}(G,\sigma_{G})$ for any skew bicharacter σ_{G} of G. This is the noncommutative equivalent of choosing a metric on these C*-algebras. We shall prove that for any skew bicharacter σ of $\mathbb{Z}^{d}$ there exists a sequence $\left(G_{n}\right) _{n\in\mathbb{N}}$ of finite quotient groups of $\mathbb{Z}^{d}$, together with a sequence $(\sigma_{n})_{n\in\mathbb{N}}$ of suitable skew bicharacters such that the C*-algebras $C^{\ast}(G_{n}%, \sigma_{n})$ converge to $C^{\ast}(\mathbb{Z}^{d},\sigma)$ for the quantum Gromov-Hausdorff distance developed by Prof. Rieffel.

Narutaka Ozawa
Title: Solid von Neumann Algebras

Abstract: I will talk on hyperbolic group von Neumann algebras. I will prove they are all "solid" and give some applications. This is partly a joint work with Sorin Popa.

Judith Packer
Title: Projective multiresolution analyses for $L^2(\mathbb R^2)$.

Abstract:The notion of ``projective" multiresolution analyses is defined, and some of their properties are discussed. The relationship to ordinary wavelet theory is given, including a discussion of frames that projective multiresolution analyses provide for $L^2(\mathbb R^2).$ The isomorphism class of the wavelet module as a finitely generated projective $C(\mathbb T^2)$-module is discussed in certain cases. This work is joint with Professor M. Rieffel of the University of California at Berkeley.

Dimitri Shlyakhtenko

Title: L^2-Betti numbers for von Neumann algebras (joint work with A. Connes)

Abstract: We define the notion of L^2 homology and L^2 Betti numbers for a tracial von Neumann algebra, or, more generally, for any involutive algebra with a trace. The definition of these invariants is obtained from the definition of L^2 homology for groups, using the ideas from the theory of correspondences. For the group algebra of a discrete group, our Betti numbers coincide with the L^2 Betti numbers of the group. We find a link between the first L^2 Betti number and free entropy dimension, which points to the non-vanishing of L^2 homology for the von Neumann algebra of a free group.