Banff International Research Station
for Mathematical Innovation and Discovery

Third Northwest Functional Analysis Symposium
March 30 – April 1, 2007

MEALS

Breakfast (Buffet): 7:00–9:00 am, Donald Cameron Hall, Saturday & Sunday (*included in workshop*)
Lunch (Buffet): 11:30–13:30, Donald Cameron Hall, Saturday & Sunday (*included in workshop*)
Dinner (Buffet): 17:30–19:30, Donald Cameron Hall, Friday & Saturday (*included in workshop*)
Coffee Breaks: As per daily schedule, 2nd floor lounge, Corbett Hall (*included in workshop*)
*Please remember to scan your meal card at the host/hostess station in the dining room for each meal.

For other meal options at the Banff Centre, there are 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

Friday

16:00	Check-in begins (Front Desk - Professional Development Centre - opne 24 hours)
	Lecture rooms available after 16:00
17:30–19:30	Dinner

Saturday

7:00–9:00	Breakfast
9:00–9:10	Opening Remarks
9:15–10:00	Jozsef Solymosi, *The distinct distances problem in d-dimensional normed spaces.*
10:00–10:30	Coffee Break, 2nd floor lounge, Corbett Hall
10:30–11:00	Márton Naszódi, *Petty numbers of normed spaces.*
11:10–11:40	Hung Le Pham, *Homomorphisms from $C_0(X)$.*
11:50–13:30	Lunch
14:20–14:50	Remus Floricel, *Classes of essential representations of product systems.*
15:00–15:30	Zhuang Niu, *Extended Rotation Algebras.*
15:30–16:00	Coffee Break, 2nd floor lounge, Corbett Hall
16:00–16:30	Anthony Quas, *Maximal rates of divergence of ergodic-type averages.*
16:40–17:10	Faruk Uygul, *A Representation Theorem for Completely Contractive Dual Banach Algebras.*
17:30–19:30	Dinner

Sunday

7:00-9:00	Breakfast (and Checkout)
9:00–9:30	Heath Emerson, *Intersection of cycles in equivariant KK-theory.*
9:40–10:10	Pedro Massey, *The Schur-Horn theorem for operators and frames with prescribed norms and frame operator.*
10:10–10:50	Coffee break, 2nd floor lounge, Corbett Hall (and Checkout)
10:50–11:20	Vladimir Troitsky, *Products of strictly singular operators.*
11:30–12:00	Chris Bose, *Approximating invariant measures in ergodic theory.*
12:10–13:30	Lunch

Remark 1. Participants are required to checkout of the guest rooms by 12 noon on Sunday.

Remark 2. Participants are welcome to use the BIRS facilities (2nd Floor Lounge, Max Bell Meeting Rooms, Reading Room) until 15:00 on Sunday. There is no coffee break on Sunday 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: **Chris Bose** (University of Victoria)
Title: *Approximating invariant measures in ergodic theory.*
Abstract: Ergodic theory provides a number of powerful tools for analysis of the asymptotic behavior of measure preserving dynamical systems. Some systems come with a natural invariant measure; many more do not. We will discuss both classical and new results about how to find invariant measures in some of these cases, and how to compute explicit approximations where there may be no tractable formula for the measure.
Keywords: Perron-Frobenius Theorem, Spectral Perturbation, Convex Optimization, and moment problems in Banach space.

Speaker: **Heath Emerson** (University of Victoria)
Title: *Intersection of cycles in equivariant KK-theory.*
Abstract: If G is a group acting properly by homeomorphisms of a locally compact space X with reasonable structure (i.e. a manifold or simplicial complex) then we describe a certain invariant of this situation, called the Lefschetz invariant. It has a functional analytic description, involving the bivariant K-theory groups of Kasparov. We describe the Lefschetz invariant in several situations and deduce from the framework a theorem analogous to the classical Lefschetz fixed point formula (containing the classical formulation as a special case.)

Speaker: **Remus Floricel** (University of Regina)
Title: *Classes of essential representations of product systems.*
Abstract: Essential representations of a product system E give rise to E_0-semigroups whose associated concrete product systems are isomorphic to E. In general, such representations are difficult to construct. Our purpose, in this talk, is to construct and discuss various classes of essential representations.

Speaker: **Pedro Massey** (University of Regina)
Title: *The Schur-Horn theorem for operators and frames with prescribed norms and frame operator.*
Abstract: Let $\mathcal{H}$ be a separable (real or complex) Hilbert space. Given a bounded positive definite operator $S \in B(\mathcal{H})$, and a bounded sequence $c = \{c_k\}_{k \in \mathbb{N}}$ of non negative numbers, the pair (S, c) is called *frame admissible* if there exists a frame $\{f_k\}_{k \in \mathbb{N}}$ for $\mathcal{H}$ with frame operator S and such that $\|f_k\|^2 = c_k$, $k \in \mathbb{N}$. We relate the existence of such frames with the problem of determining the principal diagonals of an operator in $B(\mathcal{H})$. We give a reformulation of the extended version of Schur-Horn theorem due to A. Neumann and use it to get necessary conditions, and to generalize known sufficient conditions, for a pair (S, c) to be frame admissible.
This is a joint work with J. Antezana, M. Ruiz, and D. Stojanoff.

Speaker: **Márton Naszódi** (University of Calgary)
Title: *Petty numbers of normed spaces.*
Abstract: Petty numbers are a family of integer invariants of finite dimensional normed real vector spaces, in short, Minkowski spaces. The m-th Petty number ($m > 1$) of M is the largest cardinality of a set in M with the property that among any m points of the set, there are two lying at a given distance, say one. I will present upper bounds for the Petty numbers in terms of m and the dimension of M that hold for any Minkowski space, and sharper upper bounds for specific spaces. The talk will contain (hopefully) solvable related open problems.

Speaker: **Zhuang Niu** (University of Calgary)
Title: *Extended Rotation Algebras.*
Abstract: The C*-algebra generated by the irrational rotation algebra and certain spectral projections of the canonical unitary generators is studied. It is shown that this C*-algebra has a unique tracial state. Moreover, if the spectral projections are those (one for each generator) concentrated on certain half-open intervals, the extended rotation algebra is simple and nuclear.
This is a joint work with George Elliott.

Speaker: **Hung Le Pham** (University of Alberta)
Title: *Homomorphisms from $C_0(X)$.*
Abstract: This talk is about the struture of (discontinuous) homomomrphisms from $C_0(X)$ into Banach algebras. In particular, it is shown that the continuity ideal of a homomorphism from $C_0(X)$ (the largest ideal on which the homomorphism continuous) is not always a finite intersection of prime ideals.

Speaker: **Anthony Quas** (University of Victoria)
Title: *Maximal rates of divergence of ergodic-type averages.*
Abstract: Many authors have considered "subsequence ergodic theorems", where measurements (i.e. the value of an L^p function) of a measure-preserving dynamical system are taken at a fixed sequence of times. A sequence of times is called good if the averages converge. We consider bad sequences of times and ask for the maximal rate of badness.

Speaker: **Jozsef Solymosi** (University of British Columbia)
Title: *The distinct distances problem in d-dimensional normed spaces.*
Abstract: More than 60 years ago Paul Erdos raised two questions which became the best known problems in combinatorial geometry. (i) How often can the same distance occur among N points in the plane? (ii) At least how many distinct distances must occur among N points in the plane? He conjectured that for (i) the upper bound is $N^{1+\epsilon}$ and in (ii) the lower bound is $N^{1-\epsilon}$. The first conjecture would imply the second one, however both conjectures are widely open. Even less is known for point sets of general normed spaces. We will review some results and list several problems and conjectures.

Speaker: **Vladimir Troitsky** (University of Alberta)
Title: *Products of strictly singular operators.*
Abstract: In was shown by Milman in 1970 that the product of any two strictly singular operators on $L_p[0,1]$ is a compact operator. We extend this approach to other Banach spaces. We introduce a special class of strictly singular operators such that under certain assumption on the space the product of any n operators from that class is compact.

Speaker: **Faruk Uygul** (University of Alberta)
Title: *A Representation Theorem for Completely Contractive Dual Banach Algebras.*
Abstract: In this talk, we prove that every completely contractive dual Banach algebra is completely isometric to a w^*-closed subalgebra the operator space of completely bounded linear operators on some reflexive operator space.