# Abstracts of talks

**Speaker:** Francisco Garcia
**Date:** 07/09/2009
**Title:** Strict convexity on non-complete spaces

**Abstract:** We will construct a non-strictly convex Banach space with a dense strictly convex subspace.

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**Speaker:** Mrinal Raghupathi
**Date:** 07/13/2009
**Title:** A Nevanlinna-Pick theorem for multiplier algebras

**Abstract:** Given a set $X$, a kernel $K$ on $X$, points $x_1, \ldots, x_n \in X$, and scalars $w_1, \ldots, w_n \in \mathbb{C}$, the Nevanlinna-Pick problem is to determine conditions for the existence of a function in the multiplier algebra of $K$ such that $f(x_j) = w_j$ for $j = 1, \ldots, n$.

In this talk we will review some recent results in Nevanlinna-Pick interpolation. We will show how the one-step extension method of Agler, McCullough and Quiggin can be applied to prove a Nevanlinna-Pick type theorem for the multiplier algebra of a kernel function on a set $X$. This result contains as special cases the known interpolation theorems for subalgebras of $H^\infty$.

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**Speaker:** Daniel Freeman
**Date:** 07/14/2009
**Title:** A greedy basis for $(\sum l_p^n)_{l_q}$

**Abstract:** A basis $(x_i)_{i=1}^\infty$ for a Banach space $X$ is called greedy if for every $x = \sum_{i=1}^\infty a_i x_i \in S_X$ the best n-term approximation of x is up to a constant given by taking the n terms with the largest coeficients in absolute value. Greedy bases were characterized by Konyagin and Temlyakov to be exactly those bases which are both democratic and unconditional. We prove that the Banach space $(\sum_{n=1}^\infty \ell_p^n)_{\ell_q}$ has a greedy basis whenever $1 \leq p \leq \infty$ and $1 < q < \infty$. Furthermore, we prove that the Banach space $(\sum_{n=1}^\infty \ell_p^n)_{\ell_1}$ never has a greedy basis whenever $1 < p \leq \infty$. This is joint work with Stephen Dilworth, Edward Odell, and Thomas Schlumprecht.

**Speaker:** Yun-Su Kim
**Date:** 07/17/2009
**Title:** Hilbert Spaces with respect to Operator-Valued Norms

**Abstract:** In this presentation, we introduce two kinds of operator- valued norms. One of them is an $L(H)$-valued norm. The other one is an $L(C(K))$-valued norm. We provide the notion of a Hilbert space with respect to an $L(H)$-valued norm. By a Hilbert space with respect to an $L(H)$-valued norm, we generalize the notion of a Hilbert space. Furthermore, we provide several interesting examples ($L^\infty$ and $C(Y)$) of Hilbert spaces with respect to an operator-valued norm.

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**Speaker:** Florent Baudier
**Date:** 07/27/2009
**Title:** A new metric invariant

**Abstract:** In 1986, J. Bourgain characterized the superreflexivity of a Banach space $X$ in terms of bi-Lipschitz embedding of hyperbolic dyadic trees $(B_n, \rho)$. This result is a concrete occurrence of the "the Ribe program". Bourgain's theorem can be restated as follows : $D(X) > \omega$ (or $D(X^*) > \omega$) if and only if every $(B_n, \rho)$ bi-Lipschitz embeds into $X$ with a universal positive constant distortion $C$, where $\omega$ is the first infinite countable ordinal and $D(X)$ denotes the dentability index of $X$. This is also equivalent to the embedding of the infinite dyadic tree. The talk will focus on a similar result when dealing with the relation between Szlenk index and countably branching trees. Applications concerning stability results for certain classes of Banach spaces will be given. This is a joint work with Nigel Kalton and Gilles Lancien.

**Speaker:** Ping Wong Ng
**Date:** 07/28/2009
**Title:** Projection Decomposition in Operator Algebra

**Abstract:** Motivated by the work of Dykema, Freeman, Kornelson, Larson, Ordower and Weber in frame theory, we study when a positive operator in a $C^*$-algebra can be written as a (possibly infinite) sum of (not necessarily pairwise orthogonal) projections.

For type I and type III von Neumann factors (with separable predual), we have complete characterizations. (Here, the sums of projections converge in the strong operator topology.) If B is a sigma-unital simple stable purely infinite $C^*$-algebra then for the multiplier algebra $M(B)$ of $B$, we have a complete characterization. (Here, the sums of projections converge in the strict topology.) For other cases, we have partial results.
This is joint work with V. Kaftal and S. Zhang.

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**Speaker:** Bentuo Zheng
**Date:** 07/29/2009
**Title:** On the unconditional subsequence property

**Abstract:** We show that a construction of Johnson, Maurey and Schechtman leads to the existence of a weakly null sequence $(f_i)$ in $(\sum L_{p_i})_{\ell_2}$, where $p_i \downarrow 1$, so that for all $\varepsilon > 0$ and $1 < q \leq 2$, every subsequence of $(f_i)$ admits a block basis $(1+\varepsilon)$-equivalent to the Haar basis for $L_q$. We give an example of a reflexive Banach space having the unconditional subsequence property but not uniformly so.

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**Speaker:** Nirina Randrianarivony
**Date:** 07/30/2009
**Title:** Asymptotic uniform smoothness and nonlinear embeddings

**Abstract:** Abstract: This talk complements Florent Baudier's talk last Monday by presenting the chronological state of knowledge before the Baudier, Kalton and Lancien's result. In this talk, we will see how the asymptotic uniform smoothness of a Banach space $X$ is used to study the structure of another space that can coarse bilipschitz embed into it. This is joint work with Nigel Kalton.

**Speaker:** Kevin Beanland
**Date:** 08/10/2009
**Title:** Weak Hilbert Spaces with Few Symmetries

**Abstract:** In this talk we will give an outline of the construction of a weak Hilbert space $\mathfrak{X}_{wh}$ with an unconditional basis and having the property that every operator on a block subspace $Y$ of $\mathfrak{X}_{wh}$ can be written as a diagonal operator plus a strictly singular operator. This implies that no block subspace of $\mathfrak{X}_{wh}$ is isomorphic to any of its proper subspaces. We will also present possible modifications of this construction and discuss the difficulties involved in constructing a weak Hilbert space exhibiting more conditional structure. The work we present here is joint with S.A. Argyros and Th. Raikoftsalis.

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**Speaker:** Timur Oikhberg
**Date:** 08/11/2009
**Title:** Bernstein's "lethargy" in the non-commutative setting

**Abstract:** A classical theorem of S.Bernstein states that, for any increasing sequence of finite dimensional subspaces $E_1 \hookrightarrow E_2 \hookrightarrow \ldots \hookrightarrow X$ ($X$ is a Banach space), and for any sequence $\alpha_i \searrow 0$, there exists $x \in X$ s.t. $dist(x, E_i) = \alpha_i$ for every $i$. In this talk, we consider certain non-commutative analogues of this results. We prove that, for any pair of infinite dimensional Banach spaces $X$ and $Y$, and for any sequence $\alpha_i \searrow 0$, there exists $T \in B(X, Y)$ whose sequences of approximation, Gelfand, and Kolmogorov numbers "behave like" $(\alpha_i)$. Other $s$-scales are also considered.

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**Speaker:** Francesco Fidaleo
**Date:** 08/12/2009
**Title:** Ergodic properties of Bogoliubov automorphisms in free probability

**Abstract:** We show that some $C^*$–dynamical systems obtained by "quantizing" classical ones on the free Fock space, enjoy very strong ergodic properties. Namely, if the classical dynamical system $(X, T, \mu)$ is ergodic but not weakly mixing, then the resulting quantized system $(\mathfrak{G}, \alpha)$ is uniquely ergodic (w.r.t the fixed point algebra) but not uniquely weak mixing. The same happens if we quantize a classical system $(X, T, \mu)$ which is weakly mixing but not mixing. In this case, the quantized system is uniquely weak mixing but not uniquely mixing. Finally, a quantized system arising from a classical mixing dynamical system, will be uniquely mixing. In such a way, it is possible to exhibit uniquely weak mixing and uniquely mixing $C^*$–dynamical systems whose GNS representation associated to the unique invariant state generates a von Neuman factor of one of the following types: $I_\infty$, $II_1$, $III_\lambda$ where $\lambda \in (0, 1]$.