Abstracts

Marek Bożejko
Deformed Fock spaces, Hecke operators and monotone Fock space of Muraki

Abstract: The main purpose of this talk is to extend our previous construction of T-Fock spaces from a given Yang–Baxter operator satisfying the inequalities $-1 \leq T \leq 1$ to the constructions of T-symmetric Fock spaces related to the class of Yang-Baxter-Hecke operators meeting a weaker condition that $T \geq -1$. The new representation of the monotone Fock space of N.Muraki will be given. The main idea of this paper is the new class of generalized Gaussian random variables acting on suitable T-symmetric Fock spaces. Relations with the row and column operator space will be also given.

Harold Garth Dales
Equivalences of multi-norms

Abstract: A fairly substantial theory of 'multi-norms' has been developed; see, for example, Dales and Polyakov, *Diss. Mathematicae* 488 (2012), 1–165; Dales et al, *JLMS* 86 (2012), 779–809; Dales et al, Equivalence of multi-norms, *Diss. Mathematicae*, to appear. I shall recall the basics of this theory.

We are interested in determining when two multi-norms, based on a particular Banach space E are mutually equivalent. This question can be reformulated in terms of various tensor norms on the space $c_0 \otimes E$ and also in terms of absolutely summing operators from E' to c_0, both topics to which various Polish mathematicians have made very substantial contributions in former years.

In particular, I shall consider the mutual equivalence of $(p;q)$-multi-norms on the spaces $L_r(\Omega)$, and whether a $(p;q)$-multi-norm on such a space can be equivalent to a 'standard multi-norm'. We obtain rather complete answers often by using classical inequalities. The results can be reformulated in terms of operators on lattices and in terms of matrices.

This is joint work with Oscar Blasco (Valencia) and Hung Le Pham (Wellington).

Biswarup Das
A nice property of adjointable representations of CQG algebras

Abstract: Let $(\mathcal{C}, \Delta_0)$ be a CQG-algebra and suppose that $\pi : A \to \mathcal{L}(D)$ be a $*$-representation of $\mathcal{C}$, where D is a pre-Hilbert space and $\mathcal{L}(D)$ is the set of adjointable operators on D. Then we will show that:

$\varphi := (\iota \otimes \pi) \circ \Delta_0 : \mathcal{C} \to \mathcal{C}\underline{\otimes}\mathcal{L}(D)$ lifts to a normal representation $\widetilde{\varphi} : A_r'' \to A_r'' \otimes B(\overline{D})$, $\overline{D}$ being the Hilbert completion of D. In particular, $\pi(\mathcal{C}) \subset B(\overline{D})$.

If time permits, we will discuss possible generalization of this fact to algebraic quantum groups.

Matthew Daws
Almost periodic functionals

Abstract: I will give a survey about almost periodic functionals on Banach and C*-algebras. Letting A be an algebra, and turning A^* into an A-bimodule is the usual way, a functional f is almost periodic if the orbit map $A \to A^*; a \mapsto a \cdot f$ is a compact operator. The collection of all such functionals, $AP(A)$ say, is a closed sub-bi-module which is "introverted" in the Arens product sense. One can then proceed to show that the product on A extends to a product on the dual $AP(A)^*$ which is jointly continuous on bounded sets. I will look at certain classes of algebras– C^*-algebras (where $AP(A)$ is of a particularly simple form) and $L^1(G)$. For the latter, $AP(A)$ turns out to be a sub-*-algebra of $L^\infty(G)$, and the character space a compact group– the Bohr compactifcation of G. This link with compactifications has lead people to consider the situation for "non-commutative" groups– the Fourier algebras and quantum groups. The situation is less clear here, and time allowing, I will discuss strengthened versions of the notion of "almost periodic".

Derek Kitson
The rigidity of graphs

Abstract: In this talk I will begin with an overview of rigidity theory for finite simple graphs in Euclidean space and then discuss two newly emerging themes which generate interesting problems in Analysis. A corner-stone of the finite graph theory is the Maxwell-Laman theorem for bar-joint frameworks in the Euclidean plane and we will firstly present an analogue of this result for the non-Euclidean l^p norms. Following this we will establish general principles for dealing with infinite graphs and, in particular, we will show that an infinite graph is rigid if and only if it is locally relatively rigid in the sense that every finite subgraph is contained in a finite rigid subgraph. We then characterise the infinite graphs which are rigid in the plane for all l^p norms as those graphs which contain a vertex-complete tower of finite rigid subgraphs. This characterisation is unique to the plane. Finally, we will turn to higher dimensional spaces and discuss multi-body graphs. These graphs are composed of a collection of rigid graphs (called bodies) with inter-connecting edges. We will outline how to determine when an infinite multi-body graph is rigid in any finite dimension and with any l^p norm.

Niels Laustsen
Generalized James spaces

Abstract: A Banach space is *quasi-reflexive* if it has codimension one in its bidual. The first example of a quasi-reflexive Banach space was given by James in 1950. Since then, many generalizations of his construction have been proposed. We shall consider one particular approach, due to Casazza and Lohman, in which a Banach space $J(X)$, the *generalized James space*, is associated with each Banach space X having a monotone, normalized Schauder basis.

Most previous studies of $J(X)$ have focused on the case where it is quasi-reflexive. We shall introduce a natural variant of it, $j(X)$, which coincides with $J(X)$ when the latter is quasi-reflexive, but has the advantage that it enables us to show that certain properties, which appear to follow from the quasi-reflexivity of $J(X)$, are in fact inherent consequences of the James construction. Two important instances of this philosophy are:

- No quasi-reflexive Banach space is isomorphic to its Cartesian square because the Banach algebra of bounded operators acting on a quasi-reflexive Banach space contains a maximal ideal of codimension one (namely the ideal of weakly compact operators). This is, however, true for $j(X)$, whether or not it is quasi-reflexive, provided that some mild conditions are satisfied. (Specifically, that X is not isomorphic to c_0, its basis is unconditional, and the basis of $j(X)$ is shrinking).

- Quasi-reflexive Banach spaces do not have Pełczyński's property (u), and hence they do not embed in a Banach space with an unconditional basis. As before, under some mild assumptions, this turns out to be true for $j(X)$, also in the case where it is not quasi-reflexive.

This is joint work with Alistair Bird.

Anna Pelczar-Barwacz
Examples for Ferenczi-Rosendal list of minimality types of Banach spaces

Abstract: Within the framework of the "loose" classification program of Banach spaces (up to subspaces) initiated by W.T. Gowers, V. Ferenczi and C. Rosendal provided a list of classes of Banach spaces defined in terms of richness of the family of isomorphisms in the considered space, i.e. its minimality type. We present examples of Banach spaces with unconditional basis completing the list of examples of the main six classes of Ferenczi-Rosendal list. The talk is based on the joint papers with S.A. Argyros and A. Manoussakis.

Grzegorz Plebanek
On isomorphisms of Banach spaces of continuous functions

Abstract: We consider isomorphisms and isomorphic embeddings of Banach spaces of the form $C(K)$, of continuous functions on a compact space K. We present a result establishing a certain topological connection between a pair of compacta K and L such that

(i) either $C(K) \sim C(L)$, i.e. $C(K)$ and $C(L)$ are isomorphic as Banach spaces, or

(ii) $C(K)$ embeds into $C(L)$ by a positive operator.

Our main result implies that some topological properties of a compact space L are inherited by a compactum K whenever (i) or (ii) holds; in particular, it follows that a homogeneous space K must be Corson compact assuming that $C(K) \sim C(L)$, where L is Corson compact.

Charles Read
Operator Algebras such that the spectrum of each element has no nonzero limit points

Abstract: What we about to receive is part of the fruits of the happy collaboration between CJR and David Blecher. The standard example of this phenomenon is algebras represented as compact operators on some Banach space. We are interested in some not-so-standard examples, and we will present one (non-commutative) example where the algebra is an operator algebra, having a contractive approximate identity, but the multiplication is not even weakly compact. In another (commutative) case, we have a singly generated operator algebra with contractive approximate identity, whose Gelfand transform is a null sequence (a case that might merit the description "simplest possible"); but once again, there's more to the algebra than the closed linear span of its projections.

Marcin Sabok
A solution to the isomorphism problem for separable nuclear C*-algebras

Abstract: Broadly speaking, a problem P in a class Γ is called complete in Γ if any other problem in Γ can be reduced to P. Complete problems typically appear in logic and computer science, perhaps with the most prominent examples of NP-complete problems. I will discuss a recent result which says that the isomorphism problem for separable nuclear C*-algebras is complete in the class of orbit equivalence relations. In fact, already the isomorphism of simple, separable AI C*-algebras is a complete orbit equivalence relation. This means that any isomorphism problem arising from a continuous action of a separable completely metrizable group can be reduced to the isomorphism of simple, separable AI C*-algebras. A perhaps less sophisticated way of stating this result is to say that any possible classification of separable nuclear C*-algebras must essentially use C*-algebras as the invariants. As a consequence, we get that the isomorphism problems for separable nuclear C*-algebras and for separable C*-algebras have the same complexity. This answers questions posed by Elliott, Farah, Paulsen, Rosendal, Toms and Törnquist.

Piotr Sołtan
Embeddable quantum homogeneous spaces

Abstract: I will review some aspect of the theory of noncommutative (or quantum) homogeneous spaces and describe a natural class of such objects which in joint work with P. Kasprzak we called "embeddable" following the original use of this term by Podle. Along the way I will devote some attention to a von Neumann algebraic version of this theory which exhibits an interesting duality. As an example I will shed some light on the concept of the diagonal subgroup of the direct product of a quantum group with itself.

Steven Trotter
C*-Algebras Approach to Compact Quantum Groups

Abstract: In this talk I will introduce quantum groups that have both an algebraic and topological nature in the object. From an algebraists' perspective quantum groups are often described in terms of Hopf algebras and deformations of Lie algebras. Here we take a different approach and consider the continuous functions on a compact group from which we form the basis of a compact quantum group. It is remarkable that the axioms turn out to be quite simple and far reaching. We also describe the (co)representation theory of compact quantum groups and how it closely matches that of the classical case of compact groups. If there is enough time we'll also talk briefly about multiplicative unitaries, a useful tool in the theory, and duality.

Stanisław Lech Woronowicz
Categories of C*-algebras with crossed products

Abstract: Starting with an elementary example we shall discuss crossed products $\boxtimes$ of C*-algebras equipped with an action of a quantum group G. If the construction of $\boxtimes$ is categorical then $\boxtimes$ is uniquely determined by $A \boxtimes A$, where A is an algebra of functions on G. However not all $A \boxtimes A$ give raise to $\boxtimes$ defined on whole category of C*-algebras subject to actions of G. Examples of good and bad $A \boxtimes A$ will be given.

Wiesław Żelazko

When a closed ideal of a commutative unital Banach algebra has a proper dense subideal

Abstract: Grauert and Remmert proved that a commutative unital Noetherian Banach algebra is necessarily finite dimensional (see [1], Appendix to §5). The essential step towards the proof was the following result.

Theorem A. Let I be a (proper) closed ideal in a commutative unital Banach algebra A. If the closure $J = \overline{I}$ is finitely generated, then $J = I$.

In my talk I shall consider the question whether the converse is also true. The following results were published respectively in [2] and [3].

Theorem 1. Let A be as above and suppose that an ideal I in A is not finitely generated. Then I has a dense proper subideal provided it is separable. In particular, the result is true for all separable algebras. However for I long time I could not get this result without the separabbility condition. Finally, I got the following

Theorem 2. There is a commutative unital Banach algebra A and a closed ideal I in A which is not finitely generated, but which has no proper dense subideal.

References

[1] H Grauert and B. Remmert, "Analytische Stellenalgebren," Springer 1971.

[2] W. Żelazko, When does a closed ideal of a commutative Banach algebra contains a dense subideal?, *Funct. Approx. Comm. Math.* **44** (2011), 285–287.

[3] – , Concerning dense subideals in commutative Banach algebras, *ibidem* **48** (2013), 113–115.