

# Banach Algebras and their applications

Banach algebras 2005

Bordeaux, France - July 3 to July 13, 2005

**Essa Aghdassi Alamdarri**

**Title :** Exact Constants for Best Approximation on the Group  $SU(2)$ .

**Abstract :** In the present paper we study the properties of the best upper bounds of best approximation by algebraic polynomials in metrics  $L_1$  and  $L_\infty$  for classes of convolutions defined on the group  $SU(2)$ . The exact constants for best approximation by trigonometric polynomials in  $L_\infty(-\pi, \pi)$  is studied by many authors. Finally in this paper we proved that for group  $SU(2)$  analog of the Favard–Akhiezer–Krein theorem does not hold.

**Cyril Agrafeuil**

**Title :** closed ideals of some Beurling algebras and operators.

**Abstract :**

**Asuman Aksoy**

**Title :** Metric Trees, Hyperconvex Hulls and Some fixed point Theorems.

**Abstract :** In this talk we examine the relationship between hyperconvex hulls and metric trees and show that every complete metric tree is hyperconvex. Furthermore we present a selection theorem and a fixed point theorem for certain maps defined on metric trees.

**Jeronimo Alaminos**

**Title :** Automatic continuity of operators commuting with translations.

**Abstract :** Let  $\tau_X$  and  $\tau_Y$  be representations of a topological group  $G$  on Banach spaces  $X$  and  $Y$ , respectively. We investigate the continuity of the linear operators  $\Phi: X \rightarrow Y$  with the property that  $\Phi \circ \tau_X(t) = \tau_Y(t) \circ \Phi$  for each  $t \in G$  in terms of the invariant vectors in  $Y$  and the automatic continuity of the invariant functionals on  $X$ .

**Massoud Amini**

**Title :** On nuclearity of inverse semigroup reduced  $C^*$ -algebras.

**Abstract :** We show that the universal groupoid of an inverse semigroup  $S$  is topologically (measurewise) amenable if and only if  $S$  is hyperfinite and all members of a family of subsemigroups of  $S$  indexed by the spectrum of the commutative  $C^*$ -algebra  $C^*(E_S)$  on idempotents  $E_S$  of  $S$  are amenable. We show that the reduced  $C^*$ -algebra  $C_r^*(S)$  is nuclear when  $S$  is as above.

**Oleg Aristov**

**Title** On biprojective, semi-perfect, and perfect Banach algebras.

**Abstract**

**Farkhad Arzikulov**

**Title :** Type and Pierce decompositions for  $C^*$ -algebras.

**Abstract :** It is known that any two elements  $a, b$  of a  $C^*$ -algebra  $A$ , who satisfy the conditions  $a \geq 0, ab + ba = 0$  are commute, i.e.  $ab = ba$ . This fact allows us to use *Jordan annihilators*, defined as  $Ann(S) = \{a \in A : as + sa = 0, s \in S\}$ , instead of projections in case of general  $C^*$ -algebras to research some structure and classification problems of the theory of  $C^*$ -algebras. For this propose we used the set  $\mathcal{P}$  of all Jordan annihilators of subsets of positive elements of a  $C^*$ -algebra. This set forms a complete lattice. We developed some theory of lattices of Jordan annihilators. In particular we introduced and studied such notions as orthogonal annihilators, central annihilators and equivalent annihilators. For example, an annihilator  $V \in \mathcal{P}$  is called central if  ${}^d(Ann(Ann(S))) \cap {}^d(Ann(S)) = 0$ , where  $S \subseteq A_+, V = Ann(Ann(S))$  and  ${}^dV = \{a \in A : xay + yax = 0 \text{ for all } x, y \in V\}$ . The set of all central annihilators of the lattice  $\mathcal{P}$  forms a complete sublattice. Then we introduced and researched notions of  $C^*$ -algebras of types I,  $II_1, II_\infty$  and III. Using these notions we have established that any  $C^*$ -algebra  $A$  has unique  $C^*$ -subalgebra  $B$ , who is a direct sum of  $C^*$ -subalgebras of types I, II and III, which are maximal in  $A$  annihilators of types I, II and III accordingly and  $w(B) = A$ . Then we gave an example when  $B \neq A$ . As a useful theorem used in proving of many statements of given work we proved, that for any  $C^*$ -algebra  $A$  of bounded linear operators on Hilbert space  $H$  and projection  $p \in A$  the  $*$ -closure  $w(pAp \cap A)$  of the set  $pAp \cap A$  coincides with  $pw(A)p$  and  $pAp \cap A \in \mathcal{P}$ . For example, we established that the types of a  $C^*$ -algebra  $A$  and the von Neumann algebra  $w(A)$  coincide. Then we studied correspondenceness between these notions of types and the known notions of "finite", "infinite", "properly infinite" and "purely infinite". For example, a simple  $C^*$ -algebra is purely infinite if and only if this  $C^*$ -algebra is of type III and any purely infinite  $C^*$ -algebra is of type III. In the last paragraph of our work we introduced and studied a notion of homogenous  $C^*$ -algebras that is  $C^*$ -algebras of type  $I_n, n$  — cardinal number. Then we prove that any  $C^*$ -algebra  $A$  of type I has unique  $C^*$ -subalgebra  $B$ , who is a direct sum of homogenous  $C^*$ -subalgebras, which are maximal in  $A$  annihilators of types  $I_n$ , for some cardinal numbers  $n$  and  $w(B) = A$ . Note that any  $C^*$ -algebra of type I is a GCR-algebra and any simple homogenous  $C^*$ -algebra is a CCR-algebra. In the article "On Jordan algebras of Bear type" (Bladikavkaz Mathematical Journal, www.vmj.ru, No 3, V. 4, 2002) we have realized an idea of construction of an infinite Peirce decomposition in case of monotone complete JB-algebras. It is clear that direct summands of any Peirce decomposition are Jordan annihilators. In the work we introduced a notion of infinite Peirce decomposition in case of general  $C^*$ -algebras. Further we used this notion in solving of some structure and classification problems of  $C^*$ -factors and simple  $C^*$ -algebras. We established that if the infinite Peirce decomposition  $\sum_{\xi\eta}^{\oplus} p_{\xi} A p_{\eta}$  of a  $C^*$ -algebra  $A$  with an infinite orthogonal set  $\{p_{\xi}\}$  of projections with the least upper bound 1 in  $A$  is monotone complete then this infinite Peirce decomposition is a  $C^*$ -algebra about naturally introduced associative multiplication and the norm. Conversely if projections of the set  $\{p_{\xi}\}$  are pairwise equivalent and  $\sum_{\xi\eta}^{\oplus} p_{\xi} A p_{\eta}$  is a  $C^*$ -algebra then  $\sum_{\xi\eta}^{\oplus} p_{\xi} A p_{\eta}$  is monotone complete. In here we used the constriction of infinite Peirce decomposition for monotone complete algebras. Then we introduced a notion of infinite Peirce decomposition using a constriction of infinite Peirce decomposition for simple algebras.

We proved that any  $C^*$ -factor can be represented as an infinite Peirce decomposition for monotone complete  $C^*$ -algebras or as an infinite Peirce decomposition  $\sum_{\xi\eta}^o p_\xi A p_\eta$  for simple  $C^*$ -algebras. If a  $C^*$ -factor  $A$  has an infinite Peirce decomposition  $\sum_{\xi\eta}^o p_\xi A p_\eta$  then this algebra  $A$  is simple. At the end of the work some prospects of the work are fixed.

**Catalin Badea**

**Title :** Inverse producing extensions.

**Abstract :** We study the invertibility of Banach algebra elements in their extensions, and invertible extensions of Banach and Hilbert space operators with prescribed growth conditions for the norm of inverses.

(joint work with Vladimir Muller)

**Lawrence Baggett**

**Title :** Fine Structure of Generalized Multiresolution Analyses.

**Abstract :** The rich algebraic structure within a generalized multiresolution analysis can be used to give simple derivations of the famous equations of wavelet theory as well as producing many other relations among the wavelets, the filters, and the scaling functions.

**Mohammed Berkani**

**Title :** B-Fredholm And Spectral Properties For Multipliers In Banach Algebras.

**Abstract :** The main purpose of this talk is a study of spectral and B-Fredholm properties of a multiplier  $T$  acting on a commutative semi-simple regular Banach algebra  $A$ . We show that  $T$  is a B-Fredholm operator if and only if  $T$  is a semi B-Fredholm operator, and in this case we have the index  $ind(T) = 0$ . Moreover we give necessary and sufficient conditions under which Weyl's theorem or generalized Weyl's theorem holds for  $T$ . Spectral mapping theorems for the Weyl's and B-Weyl spectrum of a multiplier are also considered. As an application, we show that the multiplication operator  $T_a$  by an element  $a$  of a regular commutative  $C^*$ -algebra  $A$  is a B-Fredholm operator if and only if  $a$  is Drazin invertible.

**Abdellatif Bourhim**

**Title :** Spectrum of bilateral shifts with operator-valued weights.

**Abstract :** We describe the spectrum of bilateral operator-weighted shifts.

**Janko Bracic**

**Title :** Reflexivity of the space of module homomorphisms.

**Abstract :** Let  $A$  be a unital Banach algebra,  $X$  and  $Y$  be a Banach  $A$ -modules, and  $B_A(X, Y)$  be the space of all bounded module homomorphisms from  $X$  to  $Y$ . We shall give a sufficient condition on the triple  $(A, X, Y)$  under which the space  $B_A(X, Y)$  is reflexive in the sense of Loginov and Shulman. We will discuss also some related questions.

**Eggert Briem**

**Title :** Operating functions for ultra non-vanishing Banach function spaces.

**Abstract :** When A. Bernard started to investigate operating functions for an ultraseparating Banach function space  $B$  on a compact Hausdorff space  $X$ , he looked at the case where the function  $\varphi(t) = |t|$  operates on  $B$ . The sequence space  $\ell^\infty(B)$  of all  $B$ -bounded sequences from  $B$  played a crucial part. We show among other things, under fairly mild separation conditions on  $B$ , that if  $B$  has a continuous non-affine operating function then there is a finite subset  $F$  of  $X$  such that the function  $\varphi(t) = |t|$  operates on the uniform closure of  $\ell^\infty(B_F)$ , where  $B_F$  consists of those functions in  $B$  that vanish on  $F$ .

### **Gabriela Bulancea**

**Title :** A Sequence Algebra Related to  $H^\infty$ .

**Abstract :** We'll present results that concern the properties of the maximal ideal space of the algebra  $\tilde{\mathcal{A}}$ , the algebra of bounded sequences of functions belonging to the disc algebra  $\mathcal{A}$ . We will show that the structure of this maximal ideal space resembles the structure of the maximal ideal space of the algebra  $H^\infty$ . Following the construction presented in Hoffman's classic paper "Bounded analytic functions and Gleason parts" for the case of  $H^\infty$ , and using the properties of the sequences of finite Blaschke products (which play for  $\tilde{\mathcal{A}}$  a role analogous to the one that the infinite Blaschke products play in the case of  $H^\infty$ ), we obtain a description of the analytic structure of the maximal ideal space of  $\tilde{\mathcal{A}}$ .

### **Yemon Choi**

**Title :** Cohomology of  $\ell_1$ -semilattice algebras.

**Abstract :** If  $S$  is a semilattice, the convolution algebra  $1(S)$  need not be amenable. Nevertheless, the simplicial cohomology of  $1(S)$  vanishes in positive degree (this extends results of Dales and Duncan for degree 2).

In this talk I shall present the requisite background for this result, say a few words on the proof, and if time permits indicate possible generalisations to Clifford semigroups.

### **Harold Garth Dales**

**Title :** Banach algebras on Stone Cech compactifications.

**Abstract :** Let  $S$  be a semigroup, and let  $A = l^1(S)$  be the semigroup algebra of  $A$ , so that  $A$  is a Banach algebra. We shall study the second dual  $A''$  of  $A$  with its two Arens products. We shall explain that these second duals are identified as a Banach space with  $M(\text{beta}S)$ , the space of regular Borel measures on the Stone-Cech compactification of  $S$ , and that we can regard  $\text{beta}S$  as a semigroup contained in the multiplicative semigroup of  $M(\text{beta}S)$ . We shall survey basic known results on the Banach algebras  $M(\text{beta}S)$ , and then discuss new results. Our general claim is that properties of  $A'' = M(\text{beta}S)$  depend very strongly on the rather complicated structure of the semigroup  $\text{beta}S$ . Our new results involve the following questions : (1) Determination when  $M(\text{beta}S)$  is amenable. (2) Determination when  $M(\text{beta}S)$  is weakly amenable. For example, the second dual of a group algebra  $L^1(G)$  is weakly amenable if and only if  $G$  is finite. (3) Determination which subsets of  $\text{beta}S$  determine the topological centre of  $M(\text{beta}S)$ ; we extend existing results. (4) Partial results towards identifying the radical of  $M(\text{beta}S)$ . The above is taken from joint work with A. T.-M Lau (Edmonton) and D. Strauss (Hull).

**Matthew Daws**

**Title :** Connes-amenability of bidual algebras.

**Abstract :** Connes-amenability of bidual algebras Abstract : We investigate the notion of Connes-amenability, introduced by Runde, for dual Banach algebras. We provide some simplifications to the notion of a  $\sigma WC$ -virtual diagonal, as introduced by Runde, especially in the case of the bidual of an Arens regular Banach algebra. We apply these results to discrete, weighted, cancellative semigroup algebras, showing that these behave in the same as  $C^*$ -algebras with regards Connes-amenability of the bidual algebra. We also show that for each one of these semigroup algebras  $l1(S, \omega)$ , we have that  $l1(S, \omega)$  is Connes-amenable (with respect to the canonical predual  $c_0(S, \omega^{-1})$ ) if and only if  $l1(S, \omega)$  is amenable, which is in turn equivalent to  $S$  being an amenable group. This latter point was first shown by Grönbaek, but we provide a unified proof.

**Sylvain Delpech**

**Title :** Some results with asymptotic uniform moduli in Banach spaces.

**Abstract :** A classical result of Elton and Odell asserts that the unit sphere of every infinite-dimensional normed space  $(X, \|\cdot\|)$  contains a  $(1 + \epsilon)$ -separated sequence for some  $\epsilon > 0$ . Recall that a sequence  $(x_n) \subset X$  is said  $K$ -separated for some  $K > 0$  if  $\|x_i - x_j\| \geq K$  for all  $i \neq j$ . We show that the  $\epsilon$  above can be quantified with the modulus of asymptotic uniform convexity of the space  $X$ .

**Ian Doust**

**Title :** A comparison of algebras of functions of bounded variation.

**Abstract :** Motivated by problems in the spectral theory of linear operators we previously introduced a new concept of variation for functions defined on a nonempty compact subset of the plane. In this talk I will examine the Banach algebras of functions of bounded variation one obtains from these new definitions for the case where the underlying compact set is either a rectangle or the unit circle, and compare these algebras with the ones previously used by Berkson and Gillespie in their theories of  $AC$ -operators and trigonometrically well-bounded operators. This is joint work with Brenden Ashton.

**Driss Drissi**

**Title :**

**Abstract :**

**Sébastien Dubernet**

**Title :** Comportement à l'origine des représentations des groupes.

**Abstract :**

**Ali Ebadian**

**Title :** On The Real Lipschitz Algebras

**Abstract :** Let  $(X, d)$  be a compact metric space and  $\tau$  be a topological involution on  $X$ . The real Banach function algebras  $\alpha(X, \tau)$ , for  $\alpha \in (0, 1]$  and  $\alpha(X, \tau)$  for  $\alpha \in (0, 1)$ , were

first defined by the authors. In this paper, we shall define a bigger class of these algebras. Also, we shall extend the Hedberg's Stone-Weierstrass theorem to the real Lipschitz algebra  $\alpha(X, \tau)$  and prove that the real Lipschitz algebra  ${}^1(X, \tau)$  is dense in  $\alpha(X, \tau)$  for  $\alpha \in (0, 1)$ , without using the complexification techniques.

**Omar El-Fallah**

**Title :** Idéaux fermés dans certaines algèbres de fonctions analytiques sur le bidisque.

**Abstract :**

**Joerg Eschmeier**

**Title :** On the reflexivity of multivariable isometries.

**Abstract :** Let  $A$  be a closed subalgebra of the algebra of all continuous functions on a compact set  $K$  in  $C^n$ . We define the notion of an  $A$ -isometry and show that, under a suitable regularity condition used to apply the work of Aleksandrov on the inner function problem, every  $A$ -isometry on a complex Hilbert space is reflexive. The result applies to  $n$ -tuples of commuting isometries, spherical isometries and, more general, to all subnormal tuples with normal spectrum contained in the Bergman-Shilov boundary of a strictly pseudoconvex or bounded symmetric domain.

**Madjid Eshaghi Gordji**

**Title :** Ideal amenability of group algebras.

**Abstract :** In this work we study the ideal amenability of Banach algebras. Let  $\mathcal{A}$  be a Banach algebra and let  $I$  be a closed two-sided ideal in  $\mathcal{A}$ ,  $\mathcal{A}$  is  $I$ -weakly amenable if  $H^1(\mathcal{A}, I^*) = \{0\}$ . Further,  $\mathcal{A}$  is ideally amenable if  $\mathcal{A}$  is  $I$ -weakly amenable for every closed two-sided ideal  $I$  in  $\mathcal{A}$ . We know that a continuous homomorphic image of an amenable Banach algebra is again amenable. We show that for ideal amenability the homomorphism property for suitable direct summands is true similar to weak-amenability and we apply this result for ideal amenability of Banach algebras on locally compact groups. It is a joint work with S.A.R.Hosseinioun.

**Hossein Esslamzadeh**

**Title :** Strict topology and weak factorization of double centralizer algebras.

**Abstract :** Let  $\mathcal{A}$  be a Banach algebra with a bounded approximate identity of bound one and  $\mathcal{D}(\mathcal{A})$  be the double centralizer algebra of  $\mathcal{A}$ . We consider the relations between the Hausdorffness of the strict topology of  $\mathcal{D}(\mathcal{A})^{**}$  induced by  $\mathcal{A}^{**}$  and a sort of factorization of  $\mathcal{D}(\mathcal{A})^*$ , which we call weak factorization.

**Jose Extremera**

**Title :** Uniqueness of rotation invariant norms.

**Abstract :** If  $N \geq 2$ , then there exist finitely many rotations of the sphere  $\mathbb{S}^N$  such that the set of the corresponding rotation operators on  $L^p(\mathbb{S}^N)$  determines the norm topology of that space for  $1 < \infty$ . For  $N = 1$  the situation becomes different : for any  $N$ -set of  $\mathbb{T}$  the set

of the corresponding rotation operators on  $L^2(\mathbb{S}^1)$  does not determine the norm topology of that space.

**Joel Feinstein**

**Title :** Banach function algebras with dense invertible group.

**Abstract :** This is joint work with Garth Dales. In an earlier paper, Dawson and Feinstein asked whether or not a Banach function algebra with dense invertible group can have a proper Shilov boundary. We give an example of a uniform algebra showing that this can happen, and investigate the properties of such algebras.

**Maria Fragoulopoulou**

**Title :** Pták function and \*-representations.

**Abstract :**

**Eva Gallardo**

**Title :** Composition operators on Hardy spaces of a simply connected domain..

**Abstract :** For any simply connected domain  $\Omega$ , we prove that a Littlewood type inequality satisfied by the symbol  $\varphi$  is necessary for boundedness of the composition operator  $C_\varphi$  on the Hardy spaces  $H^p(\Omega)$ ,  $1 \leq p < \infty$ , whenever the symbol  $\varphi$  is finitely-valent. Of course, the corresponding "little-oh" condition held by  $\varphi$  is also necessary for the compactness of  $C_\varphi$ . Nevertheless, it is shown that such inequality is not sufficient for characterizing bounded composition operators even induced by univalent symbols. Furthermore, such inequality is no longer necessary if we drop the extra assumption on the symbol of being finitely-valent. In particular, this solves a question posed by Shapiro and Smith and shows a striking link between the geometry of the underlying domain and the symbol inducing the composition operator in  $H^p(\Omega)$ ,  $1 \leq p < \infty$ .

(Joint work with María J. González and Artur Nicolau)

**Ali Ghaffari**

**Title :** Topologically left invariant mean on semigroups.

**Abstract :** Let  $S$  be a locally compact Hausdorff semitopological semigroup. Let  $M(S)$  be the Banach algebra of all Borel measure on  $S$ . We want to study topologically left invariant mean on  $M(S)^*$ .

**Fereidoun Ghahramani**

**Title :** Some results in approximate amenability.

**Abstract :** In this talk I will present some results in approximate amenability, including equivalence( non-equivalence )of various notions in this topic and approximate amenability of the Fourier algebra of a discrete amenable group.

**Julien Giol**

**Title :** Idempotents in Banach algebras.

**Abstract :**

**Stanislaw Goldstein**

**Title :**

**Abstract :**

**Pamela Gorkin**

**Title :** Infinite dimensional vector spaces of universal functions.

**Abstract :** We look at universal functions for the space of bounded analytic functions on the unit ball and give an example of an infinite dimensional closed vector space of such functions.

**Sandy Grabiner**

**Title :** Weak\* Properties of Weighted Convolution Algebras.

**Abstract :** Our main new result is that every continuous homomorphism between weighted convolution algebras on  $\mathbb{R}_+$  is automatically weak\*-continuous. As we showed previously, this will imply that if  $f$  generates a weak\*-dense ideal, then so does its image under any continuous non-zero homomorphism. The key tool is the extension of our earlier result on the weak\*-convergence to 0 of the normalized powers of all elements of the algebra to "most" elements of the related algebra of measures. If time permits, we will discuss other results that relate the weak\* and norm topologies in these algebras.

**Colin Graham**

**Title :** Two tales about bounded approximate identities.

**Abstract :** Two results, related by their use of bounded approximate identities, the first suggested by the second : 1) A new proof that  $L^1(G)$  is not Arens regular when  $G$  is not discrete. 2) Let  $S$  be a pseudomeasure on  $\mathbb{R}$ . Then  $y$  is not in the support of  $S$  iff  $\lim_{N \rightarrow \infty} \int_{-N}^N (1 - |t|/N) e^{-itu} \hat{S}(t) dt = 0$  uniformly for  $u$  in a neighbourhood of  $y$ .

**Niels Grønbæk**

**Title :**

**Abstract :**

**Bahman Hayati**

**Title :** Ideal amenability of Banach algebras.

**Abstract :** Let  $\mathcal{A}$  be a Banach algebra. We study the derivations from  $\mathcal{A}$  into duals of its ideals. We want to find some examples of weakly amenable Banach algebras which are not ideally amenable.

**Matt Heath**

**Title :** Regularity and derivations of  $R(X)$ .

**Abstract :** In [?] J.F. Feinstein constructed a compact plane set  $X$  such that  $R(X)$  has no non-zero, bounded point derivations but is not weakly amenable. In the same paper he gave an example of a separable uniform algebra  $A$  such that every point in the character space of  $A$  is a peak point but  $A$  is not weakly amenable. We show that it is possible to modify the construction in order to produce examples which are also regular.

**Seyed Alireza Hosseinioun**

**Title :** Ideal amenability of group algebras.

**Abstract :** In this paper we study the ideal amenability of Banach algebras. Let  $\mathcal{A}$  be a Banach algebra and let  $I$  be a closed two-sided ideal in  $\mathcal{A}$ ,  $\mathcal{A}$  is  $I$ -weakly amenable if  $H^1(\mathcal{A}, I^*) = \{0\}$ . Further,  $\mathcal{A}$  is ideally amenable if  $\mathcal{A}$  is  $I$ -weakly amenable for every closed two-sided ideal  $I$  in  $\mathcal{A}$ . We know that a continuous homomorphic image of an amenable Banach algebra is again amenable. We show that for ideal amenability the homomorphism property for suitable direct summands is true similar to weak-amenability and we apply this result for ideal amenability of Banach algebras on locally compact groups.

**Monica Ilie**

**Title :** On completely bounded Fourier algebra homomorphisms.

**Abstract :** In 1964 P. Eymard introduced the non-commutative analogs of the classical group and measure algebra of a locally compact group  $G$ , the so called Fourier algebras  $A(G)$  and  $B(G)$ . They have a natural operator space structure as preduals of von Neumann algebras.

In this talk I will present a survey of recent results regarding the completely bounded algebra homomorphisms of the Fourier algebra  $A(G)$  of a locally compact group  $G$ . We discuss the description as well as the  $w^*$ - $w^*$  continuity of such homomorphisms, in the framework of operator spaces.

This talk is based on separate work with Nico Spronk and with Ross Stokke.

**Karim Ivaz**

**Title :** Application of Banach Fixed Point Theorem.

**Abstract :** In this paper we consider a two phase free boundary problem, which arises naturally as a mathematical model of a variety exothermic phase transition type process. The main result of this paper establishes existence by application of Banach fixed point theorem.

**Mohammar Reza Jabbarzadeh**

**Title :** Essential Norm of  $uC_\varphi$  on measurable function spaces

**Abstract :** Weighted composition operators  $uC_\varphi$  between measurable function spaces generated by the pair  $(u, \varphi)$  are considered. In this paper by using conditional expectation operator, we determine essential norm of  $uC_\varphi$  on measurable function spaces in terms of the set  $\{x \in X : J(x) \geq r > 0\}$  on.

**Sten Kaijser**

**Title :** Pseudo-determinants on Banach Algebras and Banach Modules.

**Abstract :** A pseudo-determinant on a Banach Algebra  $A$  is a homomorphism from the multiplicative semigroup of  $A$  into the multiplicative semigroup  $[0, \infty]$ . Pseudo-determinants can also be defined on Banach Modules, and they are useful for finding factorizations of elements in  $A'$ . I shall present the main known results of pseudo-determinants.

**Herbert Kamowitz**

**Title :** Quascompact and Riesz endomorphisms of Banach algebras.

**Abstract :** This is joint work with Joel Feinstein. Let  $B$  be a unital commutative semi-simple Banach algebra. We study endomorphisms of  $B$  which are also quascompact operators or Riesz operators. Clearly compact and power compact endomorphisms are Riesz and hence quascompact. Several general theorems about quascompact endomorphisms are proved, and these results are then applied to the question of when quascompact or Riesz endomorphisms of certain algebras are necessarily power compact.

**Amir Khosravi**

**Title :** Derivations on Algebras.

**Abstract :** Let  $A$  be a complex algebra with Jacobson radical  $R$  and  $D$  be a derivation on  $A$ . Thomas proved Singer and Wermer's conjecture in 1988. The non-commutative version of Singer and Wermer conjecture states that derivation  $D$  on a Banach algebra preserves the primitive ideals of  $A$  invariant. We defined the set

$$K = \{x \in R : \text{for every natural number } n, d^n x \in R\}$$

in 1980 and later proved that  $d$  preserves the primitive ideals of  $A$  invariant if and only if  $K$  is closed. We also proved that  $d$  maps into the radical if the induced derivation  $d_K : A/K \rightarrow K$  is centralizing or  $K$  is closed and  $d_K$  is spectrally bounded. We also generalize some of the known results about derivations on Banach algebras to local Banach algebras and to  $\rho$ -Banach algebras, where  $0 \leq \rho \leq 1$ .

**Vladimir Kisil**

**Title :** Algebraic and Analytic Aspects of Covariant Functional Calculus.

**Abstract :** Covariant functional calculus is defined as an *intertwining operator* between certain group representations [1, 2]. The intertwining property replaces the algebraic homomorphism required by the standard definition of functional calculus. This gives advantages in consideration of non-normal operators [2] and enable functional calculus of several non-commuting operators [1, 3]. Spectrum of operator (or a  $n$ -tuple of operator) is defined as the *support* of the functional calculus [2], i.e. collection of nonvoid intertwining operators with primary representations. The previous results [2, 3] was mainly dealing with finite-dimensional operators and thus have essentially algebraic nature. The passage to infinite dimensional operators highlights interesting analytic structure in the category of intertwining operators. [1] V.V. Kisil, Mobius transformations and monogenic functional calculus, Electron. Res. Announc. Amer. Math. Soc. 2 (1996), no. 1, 2633, (electronic) MR 98a :47018. [2] V.V. Kisil, Spectrum as the support of functional calculus, Functional Analysis and its

Applications (Proceedings of the S. Banach Conference) (North-Holland) (V. Kadets and W. Zelazko, eds.), Math. Studies series, vol. 197, Elsevier Science Publishers, 2004, E-print : arXiv :math.FA/0208249, pp. 133142. [3] V.V. Kisil, Monogenic calculus as an intertwining operator, Bull. Belg. Math. Soc. Simon Stevin 11 (2005), E-print : arXiv :math.FA/0311285.

### **Louis Labuschagne**

**Title :** Characterizations of noncommutative  $H^\infty$ .

**Abstract :** In joint work with David Blecher we transfer a large part of the classical circle of theorems characterizing the generalisation of  $H^\infty$  known as “weak\* Dirichlet algebras”, to Arveson’s noncommutative setting of subalgebras of finite von Neumann algebras.

### **David Larson**

**Title :** The Well-Posed Matrix Completion Problem.

**Abstract :** Matrix completion problems have been widely investigated by a number of researchers, with potential applications to engineering, as well as for their connections with the mathematical theory of hyperreflexivity of operator algebras. Most results in the literature have dealt with formulas and algorithms, and the special cases where they apply. A few years ago this author, with Don Hadwin and Dan Timotin, introduced a new point of view in matrix completion problems : tackling such problems from a “well-posedness” point of view. It turned out that certain such problems are well-posed in the sense of uniqueness and stability of an optimal solution, even if traditional algorithms for distance and optimality might fail. We showed, in particular for the special case of the algebra of 3x3 diagonal complex matrices, the cases in which the traditional algorithm (Arveson’s distance estimate) yields optimality for distance have the technical difficulty that uniqueness fails, whereas the cases in which the Arveson distance estimate fails to give an optimal distance are all, in fact, cases of well-posedness. In this talk we build onto this work further, raising some open questions that we feel are interesting.

### **NielsJakob Laustsen**

**Title :** Involutions on the Banach algebra of operators on a Banach space.

**Abstract :** We study the class of Banach spaces  $E$  such that an involution can be defined on the Banach algebra  $\mathcal{B}(E)$  of all bounded, linear operators on  $E$ . Our motivating example is the standard involution on  $\mathcal{B}(H)$  for a Hilbert space  $H$ .

### **Christian Le Merdy**

**Title :** Unitary Dilations on noncommutative  $L^p$  spaces.

**Abstract :** Let  $(M, \tau)$  be semifinite von Neumann algebra, let  $1 < \infty$ , and let  $L^p(M)$  denote the associated noncommutative  $L^p$ -space. We say that a completely positive contraction  $u: L^p(M) \rightarrow L^p(M)$  has the dilation property if there exist another semifinite von Neumann algebra  $(M', \tau')$ , complete contractions  $J: L^p(M) \rightarrow L^p(M')$  and  $Q: L^p(M') \rightarrow L^p(M)$ , as well as a complete isometry  $U: L^p(M') \rightarrow L^p(M')$  such that  $u^n = QU^nJ$  for any integer  $n \geq 0$ . A famous result of Akcoglu asserts that in the commutative case (that is, if  $M$  is abelian), then this property holds for any (completely) positive contraction  $u: L^p \rightarrow L^p$ . In

this case, the dilation  $U$  acts on a commutative  $L^p$ -space as well. Our main result is that for any 1

**Ying-Fen Lin**

**Title :** Vector-valued disjointness preserving operators

**Abstract :** Let  $T : C_0(X, E) \rightarrow C_0(Y, F)$  be a disjointness preserving bounded linear operator, where  $X, Y$  be locally compact Hausdorff spaces and  $E, F$  be Banach spaces. A necessary and sufficient condition is given in this talk for such operator  $T$  to be compact.

**Richard Loy**

**Title :** Approximate amenability of sequence algebras

**Abstract :** Approximate amenability was introduced by Ghahramani and Loy several years ago, as what can be viewed as an "unbounded" generalization of the classical notion of amenability due to Johnson. The new notion sometimes coincides with the old, but this is rare. Most of the arguments from the standard theory founder because of the possible unboundedness. Even basic questions are still open.

In this talk we will focus on the special situation of Banach sequence algebras. Here the extra structure enables simpler formulations to be obtained and new classes of approximately amenable, non-amenable algebras can be demonstrated. Examples will be detailed to show how subtle considerations of approximate amenability can be.

**Zinaida Lykova**

**Title :** Cohomology of strict inductive limits of Fréchet algebras.

**Abstract :** We present methods for the computation of the Hochschild and cyclic-type continuous homology and cohomology of some locally convex strict inductive limits  $A = \varinjlim_m A_m$  of Fréchet algebras  $A_m$ . In the pure algebraic case it is known that, for the cyclic homology of  $A$ ,  $HC_n(A) = \varinjlim_m HC_n(A_m)$  for all  $n \geq 0$ . We show that, for a locally convex strict inductive system of Fréchet algebras  $(A_m)_{m=1}^\infty$  such that

$$0 \rightarrow A_m \rightarrow A_{m+1} \rightarrow A_{m+1}/A_m \rightarrow 0$$

is topologically pure for each  $m$  and for continuous Hochschild and cyclic homology, similar formulas hold. For such strict inductive systems of Fréchet algebras we also establish relations between the continuous cohomology of  $A$  and  $A_m$ ,  $m \in \mathbf{N}$ . For example, for the continuous cyclic cohomology  $\mathcal{H}C^n(A)$  and  $\mathcal{H}C^n(A_m)$ ,  $m \in \mathbf{N}$ , we show the exactness of the following short sequence, for all  $n \geq 0$ ,

$$0 \rightarrow \varprojlim_m^{(1)} \mathcal{H}C^{n-1}(A_m) \rightarrow \mathcal{H}C^n(A) \rightarrow \varprojlim_i \mathcal{H}C^n(A_m) \rightarrow 0,$$

where  $\varprojlim_m^{(1)}$  is the first derived functor of the projective limit. We give explicit descriptions of continuous periodic and cyclic homology and cohomology of a  $LF$ -algebra  $A = \varinjlim_m A_m$  where,

for each  $m$ , a Fréchet algebra  $A_m$  is a closed ideal of  $A_{m+1}$ , has a left or right bounded approximate identity and has trivial continuous naive Hochschild cohomology groups  $\mathcal{H}_{naive}^n(A_m)$  for all  $n \geq 1$ .

**Martin Mathieu**

**Title :** Local multipliers and beyond.

**Abstract :** In the first part of the talk I will report on some very recent work on a question of G K Pedersen concerning the structure of the local multiplier algebra. In the second part I shall discuss an extension of the local multiplier algebra, the maximal C\*-algebra of quotients and some of its properties. Both parts are joint work with Pere Ara (Barcelona).

**Alireza Medghalchi**

**Title :**  $n$ -weak amenability of a Banach algebra when  $n$  is an integer.

**Abstract :** We extend the concept of  $n$ -weak amenability to  $n$  belongs to  $\mathbb{Z}$ .

**Vivien Miller**

**Title :** **A Class of Averaging Operators Related to Generalized Cesàro Operators**

**Abstract :** We consider the operator  $A_g : H^p(\mathbb{D}) \rightarrow H^p(\mathbb{D})$  such that

$$(A_g f)(z) = \frac{1}{z-1} \int_1^z f(\omega)g(\omega)d\omega$$

If  $g = 1$ , then  $A_g$  is the adjoint of the classical Cesàro operator. We show that if  $g(1) = 1$ ,  $\frac{1-g(\omega)}{1-\omega} \in H^\infty(\mathbb{D})$  and  $g(\omega) \neq 0$  for all  $\omega \in \mathbb{D}$ , then  $A_g^*$  is subdecomposable on  $H^p(\mathbb{D})$  for  $1 < p < \infty$ . This is joint work with E. Albrecht.

**Alireza Mirmostafae**

**Title :** Scattered compact  $K$  with  $\sigma$ -fragmentable  $C_p(K)$ .

**Abstract :** For a scattered compact space  $K$ , we show that  $\sigma$ -fragmentability of  $C_p(K)$  is equivalent to the existence of a winning strategy for one of the players in a special topological game in  $K$ . The absence of a winning strategy for the other player in the game characterizes the so called  $\alpha$ -favorable Namioka property. We show also how these criterions could be used to get new proofs of some old results as well as some new results.

**Vladimir Muller**

**Title :** Hyperreflexivity of finite dimensional subspaces.

**Abstract :** Every finite-dimensional reflexive subspace of operators is hyperreflexive. This gives a positive answer to a problem of Kraus and Larson.

**Wassim Nasserddine**

**Title :** Généralisation de la transformation de Fourier à certains groupes localement compacts non abéliens.

**Abstract :** Soit  $G_{nm} = ax + b$  ( $m \geq n$ ) le groupe matriciel d'un corps local. En 1978 Eymard-Terp ont généralisé le théorème de Hausdorff-Young sur  $G_{11}$ . On établit dans cet exposé le théorème de Hausdorff-Young sur  $G_{nm}$  pour tout  $n$  dans  $N$ . D'autre part on étend certains résultats, autour de la transformation de Fourier, aux groupes séparables unimodulaires de type I et aux groupes  $G_{nm}$ .

### Yadollah Nejad Dehghan

**Title :** Compactness and nuclearity of weighted composition operators on vector valued function spaces.

**Abstract :** Let  $X$  be a compact Hausdorff space and  $V$  a complex Banach algebra and let  $C(X, V)$  denote the space of all continuous  $V$ -valued functions defined on  $X$ . Let  $\phi$  be a continuous self map on  $X$  and  $u : X \rightarrow B(X)$  a fixed continuous map. We will consider a weighted composition operator  $T : A(X, V) \rightarrow C(X, V)$  by  $(Tf)(x) = u(x)f(\phi(x))$  where  $A(X, V)$  is a closed subspace of  $C(X, V)$ . We will investigate compactness and nuclearity of  $T$ .

### Matthias Neufang

**Title :** On recent advances in the topological centre problem.

**Abstract :** Given a Banach algebra  $A$ , a natural way of measuring its Arens irregularity is to consider the sets of elements in the bidual for which left (resp. right) multiplication with respect to both Arens products is the same, called the first (resp. second) topological centre. We also have an analogous notion for certain quotient algebras of the bidual, and in the context of semigroup compactifications.

The talk aims at presenting recent progress we have made in determining the topological centre for various algebras arising in abstract harmonic analysis. We shall particularly focus on the following :

joint work with S. Ferri For an unbounded, separable group  $G$  which is not necessarily locally compact (such as the automorphism group of the countable random graph, or any infinite-dimensional separable Banach space) we give a description of the topological centre for the algebra  $LUC(G)^*$ .

– Let  $G$  be a locally compact non-compact abelian group. Then there are two elements in the remainder  $G^{LUC} \setminus G$  (where  $G^{LUC}$  denotes the  $LUC$ -compactification of  $G$ ) with the following property : if  $m \in G^{LUC}$  commutes with these elements, then we must have  $m \in G$  (such a phenomenon was first discovered by H.G. Dales and A.T.-M. Lau).

joint work with my student D. Dunne It is possible to extend the definition of the Arens product to the algebraic dual of  $A^*$ , which comes together with a natural concept of topological centre. Interestingly, it turns out that for a considerable class of Banach algebras, functionals belonging to the latter are automatically bounded and  $w^*$ -continuous.

Moreover, we shall discuss applications of the techniques to the study of the bidual of the Fourier algebra [joint work with M. Filali and M. Sangani-Monfared], the structure of certain module maps on von Neumann algebras, and a characterization of equi left uniform continuity.

### Michael Neumann

**Title :** Generalized Cesaro operators on Hardy and Bergman spaces.

**Abstract :** The talk centers around the spectral picture and the spectral decomposition properties of a class of operators which may be viewed as natural generalizations of the classical Cesaro operator on certain spaces of analytic functions. Particular emphasis will be on the finer parts of the spectrum of such operators and on the question of subnormality, hyponormality, and subdecomposability. Our tools are from the theory of Banach algebras. The talk is based on joint work with Ernst Albrecht and Len Miller.

**Chi-Keung Ng**

**Title :**

**Abstract :**

**Nikolai Nikolski**

**Title :** Numerical Gelfand theory : condition numbers, Bezout equations, and analytic capacities.

**Abstract :** An overview of the efficient inversion problem is presented, that is, of the problem of bounding the inverses and resolvents in terms of spectral data. The roles of functional calculi and corresponding analytic capacities are stressed, especially for the case of the Wiener algebra, Besov classes, and Beurling-Sobolev spaces. Existing results on multipliers, Toeplitz and Hankel matrices are also discussed.

**Kouros Nourouzi**

**Title :** Exposed Points of The Set of Completely Positive Maps.

**Abstract :** In the seminal work of Arveson (Subalgebras of  $C^*$ -algebras, Acta Math. 123, 141-224), where a substantial development of the theory and applications of completely positive maps is given, considerable attention is paid to the extremal structure of the convex cone formed by these maps. Along these line, we shall concentrate on some particular set of completely positive maps and obtain new results which determines the geometric structure of these sets. Specifically, for two  $C^*$ -algebras  $A$  and  $B$ , the linear map  $\varphi : A \rightarrow B$  is called completely positive map if map  $\varphi \otimes I_n : A \otimes M_n \rightarrow B \otimes M_n$  is positive for all  $n \geq 1$ . If  $A$  is unital and  $H$  complex Hilbert space, the set of all completely positive linear maps  $CP(A, H)$  of  $A$  into  $B(H)$ , where  $B(H)$  denotes the  $C^*$ -algebra of all bounded linear operators on  $H$  is studied. In this talk we will use of exposed points to find out some properties of the set of completely positive maps. Namely, let  $\Gamma$  be a closed convex set in a complex normed space  $X$ . An element  $\omega \in \Gamma$  is said to be an exposed point if there is a norm continuous linear functional  $f$  on  $X$  such that  $Re f(x) < Re f(\omega)$  for all  $x \in \Gamma \setminus \{\omega\}$

**Thomas Oliver**

**Title :** Extensions of endomorphisms of  $C(X)$ .

**Abstract :** We shall investigate the topological and algebraic obstacles to an endomorphism of  $C(X)$  being able to extend to be an endomorphism of an Arens-Hoffman extension  $C(X)[t]/pC(X)[t]$  of  $C(X)$ .

**Anders Olofsson**

**Title :** Wandering subspace theorems.

**Abstract :** Let  $\mathcal{H}$  be a Hilbert space and  $T \in \mathcal{L}(\mathcal{H})$  a bounded linear operator on  $\mathcal{H}$  which is bounded from below. We consider the approximation relation

$$\mathcal{H} = [\mathcal{E}]_T = \bigvee_{k=0}^{\infty} T^k(\mathcal{E}), \quad \text{where } \mathcal{E} = \mathcal{H} \ominus T(\mathcal{H}),$$

as well as some stronger statements phrased in terms of summability of the (formal) series

$$x \sim \sum_{k \geq 0} T^k P L^k x \quad (x \in \mathcal{H}).$$

Here  $L = (T^*T)^{-1}T^*$  is the left inverse of  $T$  with  $\ker L = \ker T^* = \mathcal{E}$  and  $P = I - TL$  is the orthogonal projection of  $\mathcal{H}$  onto  $\mathcal{E}$ . The principal new result is an estimate of Fourier multiplier type for this series. The results obtained include strengthened forms of previous results by A. Aleman, S. Richter, S. M. Shimorin and C. Sundberg.

### Shital Patel

**Title :** Frechet algebras of power series and automatic continuity.

**Abstract :** Our main result shows that a non-Banach Frechet algebra of power series is either an algebra of all formal power series or a Beurling-Frechet algebra. This result is used to give some applications to the theory of automatic continuity, including a special case of the "Michael's problem". The uniqueness of the Frechet space topology for such algebras is also established.

### Vladimir Peller

**Title :** Multiple operator integrals and higher operator derivatives.

**Abstract :** We consider the problem of the existence of higher derivatives of the function  $t \mapsto (A + tK)$ , where  $\cdot$  is a function on the real line,  $A$  is a self-adjoint operator, and  $K$  is a bounded self-adjoint operator. We improve earlier results by Sten'kin. In order to do this, we give a new approach to multiple operator integrals. We also consider a similar problem for unitary operators.

### Violeta Petkova

**Title :** Symbol of operator commuting with translations.

**Abstract :** We prove that every multiplier  $M$  i.e. bounded operator commuting with the shift operator  $S$  on a large class of Banach spaces of sequences on  $\mathbb{Z}$  is associated to a function essentially bounded by the norm of  $M$  on  $\text{spec}(S)$ . This function is holomorphic on the interior of  $\text{spec}(S)$ . We generalize these results for operators commuting with translations on a large class of Banach spaces of functions on a locally compact abelian group.

### Hung Pham

**Title :** Continuity ideals and finite intersections of prime ideals.

**Abstract :** We establish a necessary condition for a commutative Banach algebra  $A$  so that there exists a homomorphism from  $A$  into another Banach algebra such that the prime radical of the continuity ideal of this homomorphism is not a finite intersection of prime ideals in  $A$ . We prove that the prime radical of the continuity ideal of an epimorphism from  $A$  onto another Banach algebra (or of a derivation from  $A$  into a Banach  $A$ -bimodule) is always a finite intersection of prime ideals. Under an additional cardinality condition and assuming the Continuum Hypothesis, this necessary condition is proved to be also sufficient. Examples of homomorphisms between commutative Banach algebras whose continuity ideals are not intersections of prime ideals or are semiprime ideals but not finite intersections of prime ideals are presented. We also extend the class of commutative algebras which are known to be normable.

**Alexei Pirkovskii**

**Title :** Flat cyclic Fréchet modules and approximate identities.

**Abstract :** Let  $A$  be a Banach algebra,  $A_+$  its unitization, and  $I \subset A_+$  a closed left ideal. Helemskii's theorem states that the cyclic Banach  $A$ -module  $X = A_+/I$  is strictly flat if and only if  $I$  has a right bounded approximate identity. This theorem plays an important rôle in questions related to amenability. Our aim is to generalize this criterion to the case where  $A$  is a locally  $m$ -convex Fréchet algebra. To this end, we introduce a notion of locally bounded approximate identity (a.i.), and we show that  $X$  is strictly flat if and only if  $I$  has a right locally bounded a.i. We also give an example of a commutative locally  $m$ -convex Fréchet algebra that has a locally bounded a.i., but does not have a bounded a.i. On the other hand, we show that a distinguished locally  $m$ -convex Fréchet algebra has a locally bounded a.i. if and only if it has a bounded a.i. Some applications to amenable Fréchet algebras are also given.

**Christine Podara**

**Title :** Construction of strictly flat Fréchet modules in terms of bounded approximate identities.

**Abstract :** It is known that if  $A$  is a Banach algebra and  $I$  a closed left ideal in the unitization  $A_+$  of  $A$ , such that  $I$  has a bounded approximate identity, then the  $A$ -modules  $I$  and  $A_+/I$  are strictly flat (see "A. Ya. Helemskii, The Homology of Banach and Topological Algebras, Kluwer Academic Publishers", p.240, Theorem 1.5). We shall describe all the necessary ingredients that provide us with strictly flat Fréchet modules in the category of Fréchet algebras, by simply using bounded approximate identities.

**Maxim Polyakov**

**Title :** Multinorms and their applications.

**Abstract :** We introduce a notion of a multinorm on the product of Banach spaces. This is a natural generalization of a classical Banach norm. Multinorms appear on many spaces of functional analysis (for example, on each Banach space with unconditional Schauder basis). Many notions of functional analysis have analogues in "multi-normed" theory. There are many examples of "Banach multi-algebras", which are also Banach algebras in a classical sense. In

our article we discover some properties of these algebras. This article was written together with professor H.G.Dales

**Sandra Pott**

**Title :** Little Hankel operators, paraproducts and Lorentz-BMO spaces on the polydisk.

**Abstract :** We investigate a scale of Lorentz-BMO spaces on the polydisk. This is joint work with Oscar Blasco.

**Abdolrasoul Pourabbas**

**Title :** Approximate Identities in  $M_a(S)$ .

**Abstract :** Let  $G$  be a locally compact group. Then  $M_a(G)$ , the space of all absolutely continuous measures on  $G$ , has a bounded approximate identity. Baker and Baker proved that  $\mathcal{I}(S)$  (the space of all measure  $\mu \in M(S)$  so that maps  $x \mapsto \varepsilon_x * |\mu|$  and  $x \mapsto |\mu| * \varepsilon_x$  are weak continuous from a locally compact semigroup  $S$  into  $M(S)$  is closed under absolutely continuity and has an approximate identity. The main purpose of this paper is to show that similar results hold true for a locally compact semigroup  $S$  and  $M_a(S)$  the space of all absolutely continuous measures on  $S$ .

**Ebrahim Pourreza**

**Title :** Local Ultraing and Peaking Sets in Operator Algebras.

**Abstract :** Two properties of subspace of  $C^*$ - Banach algebras are investigated which are closely related to Mathieu's concept of ultraprime Banach algebras.

**Gerhard Racher**

**Title :** On vector-valued means.

**Abstract :** Some results on translation invariant operators defined on  $L^\infty(G)$  are given in dependence of the amenability of the locally compact group  $G$ .

**Thomas Ransford**

**Title :** Factorization of weakly compact homomorphisms.

**Abstract :** It is well known that a linear operator between Banach spaces is weakly compact iff it factors through a reflexive Banach space (Davis-Figiel-Johnson-Pelczynski, 1974). Perhaps surprisingly, the natural analogue of this result for Banach lattices fails in general (Talagrand, 1986). However, the analogue for Banach algebras is true (Blanco-Kaijser-Ransford, 2004). In this talk I shall discuss the Banach-algebra result and the methods used to prove it.

**Charles John Read**

**Title :** (provisional) Normed algebras without nontrivial closed subalgebras.

**Abstract :** It is a long standing open problem whether there is any infinite dimensional commutative Banach algebra without nontrivial closed ideals. This is in some sense the Banach algebraists' counterpart to the invariant subspace problem for Banach spaces. We do not here solve this famous problem, but solve a related problem, that of finding (necessarily

commutative) normed algebras which do not even have nontrivial closed subalgebras. Our examples are incomplete normed algebras rather than Banach algebras. The problem of finding such algebras, posed by W. Zelazko, was until now open not only for normed algebras but for more general topological algebras. Our construction here is shorter because it uses a key lemma involved in the construction of the LRRW algebra (that's Loy, Read, Runde and Willis - inventors of this "interesting" Banach algebra). The algebras we find are dense subalgebras of certain commutative Banach algebras with compact multiplication.

**Ahmadi Reza**

**Title :** Some Results on Localizing Sets for Sigma Algebra.

**Abstract :** In this paper we will consider the weighted composition operators  $uC_\varphi$  between two different  $L^p(X, \Sigma, \mu)$  spaces, generated by measurable and non-singular transformations  $\varphi$  from  $X$  into itself and measurable functions  $u$  and some results of localizing sets for sigma sub-algebras will be investigated by the language of conditional expectation operator.

**Maria Roginskaya**

**Title :** Point spectra of partially power-bounded operators.

**Abstract :** In this talk I will present the results joint with Thomas Ransford bringing some new light on the old theorem of Jamison.

Let  $T$  be an operator on a separable Banach space, and denote by  $\sigma_p(T)$  its point spectrum. We show that though number of previous related results hinted the oposite, it is possible that  $\sigma_p(T) \cap \mathbb{N}$  is uncountable, yet  $\|T^n\| \not\rightarrow \infty$ . We further investigate the relationship between the growth of sequences  $(n_k)$  such that  $\sup_k \|T^{n_k}\|_\infty < \infty$  and the possible size of  $\sigma_p(T) \cap \mathbb{N}$ .

**Jean Roydor**

**Title :** Subalgebras of subhomogeneous  $C^*$ -algebras and their modules.

**Abstract :** This talk concerns operator algebras. We give an operator space characterization of subalgebras of  $C(\Omega, M_n)$ . We also describe injective subspaces of  $C(\Omega, M_n)$  and then give applications to sub-TROs of  $C(\Omega, M_n)$ . Finally, we prove an ‘ $n$ -minimal version’ of the Christensen-Effros-Sinclair representation theorem of operator modules.

**Zhong-Jin Ruan**

**Title :** Completely Bounded Multipliers on Fourier Algebras.

**Abstract :**

**Volker Runde**

**Title :** Cohen–Host type idempotent theorems for representations on Banach spaces with applications.

**Abstract :** The Cohen–Host type idempotent theorem asserts that a subset of a locally compact group  $G$  lies in the coset ring of  $G$ , i.e., the ring of subsets generated by the left cosets of open subgroups of  $G$ , if and only if its indicator function lies in the Fourier–Stieltjes algebra of  $G$ , i.e., is a coefficient function of a unitary representation of  $G$  on some Hilbert

space. We prove variants of this result for representations of  $G$  on possibly non-Hilbertian Banach spaces. We then put our results to work in the study of the Figà-Talamanca–Herz algebras  $A_p(G)$  for  $p \in (1, \infty)$ . In particular, we characterize — for amenable  $G$  and arbitrary  $p \in (1, \infty)$  — the closed ideals of  $A_p(G)$  that have a bound one approximate identity, and we show that  $A_p(G)$  is 1-amenable for some — and, equivalently, for all —  $p \in (1, \infty)$  if and only if  $G$  is abelian.

### **Olivier Réjasse**

**Title :** Reflexivity results for polynomially bounded operators.

**Abstract :** In 2004, Ambrozie and Müller have proved some results of invariant subspaces for polynomially bounded operators on Banach spaces. We will show some factorization and reflexivity results for this class of operators ; in particular, every polynomially bounded operator on a reflexive Banach space such that his spectrum contains the unit circle has a non trivial hyper-invariant subspace or is reflexive

### **Ildar Sadeqi**

**Title :** A note on the Bishop- Phelps property.

**Abstract :** A point  $x_0$  of a closed convex subset of a complex B-space  $X$  is called modular support point if there exists an  $f$  in  $X^*$  such that  $\sup\|f\|(C) = \|f(x_0)\|$ . The question is that whether the Bishop-Phelps theorem does hold true by the new definition of modular support point. Lomonosov in 1999, constructed a complex B-space  $X$  and a closed convex subset  $S$  of  $X$  such that the set of modular support point of  $S$  is empty. So the Bishop-Phelps theorem can not be extended to general complex B-spaces. Sadeqi has shown that the BPP and RNP are equivalent in the complex case. It is also well known that the BPP implies the Bishop-Phelps theorem. So if a complex B-space  $X$  has the RNP then the Bishop-Phelps theorem remain true in general. In this note we discuss on the complex case of F-exposed points and get some new results.

### **Mohammad Sal Moslehian**

**Title :** Hyers-Ulam Stability in Hilbert  $C^*$ -modules.

**Abstract :** One of interesting questions in the theory of functional equations is the following : When is it true that a function satisfying a functional equation  $\mathcal{E}$  approximately must be close to a real solution of  $\mathcal{E}$  ? If there exists an affirmative answer, we say that the equation  $\mathcal{E}$  is stable.

In this paper, we prove the Hyers-Ulam stability of some certain mappings and functional equations in the context of Hilbert  $C^*$ -modules.

### **Ebrahim Samei**

**Title :** Hyper-Tauberian algebras and weak amenability of Figà-Talamanca-Herz algebras.

**Abstract :** We study certain commutative regular semisimple Banach algebras which we call hyper-Tauberian algebras. We first show that they form a subclass of weakly amenable Tauberian algebras. Then we investigate the basic and hereditary properties of them. We

apply these results to the Figà-Talamanca-Herz algebra  $A_p(G)$  of a locally compact group  $G$  for  $p \in (1, \infty)$ . We show that  $A_p(G)$  is hyper-Tauberian if the principal component of  $G$  is abelian. Finally, by considering the quantization of these results, we show that for any locally compact group  $G$ ,  $A_p(G)$ , equipped with an appropriate operator space structure, is a quantized hyper-Tauberian algebra. This, in particular, implies that  $A_p(G)$  is operator weakly amenable.

**Jaydeb Sarkar**

**Title :** Characteristic Function of a Pure Commuting Contractive Tuple.

**Abstract :** A commuting tuple of bounded operators  $T = (T_1, \dots, T_n)$  acting on a Hilbert space  $\mathcal{H}$  is called contractive if  $\|T_1 h_1 + \dots + T_n h_n\|^2 \leq \|h_1\|^2 \dots + \|h_n\|^2$  for all  $h_1, \dots, h_n$  in  $\mathcal{H}$ . This is equivalent to demanding that  $\sum_{i=1}^n T_i T_i^* \leq 1_{\mathcal{H}}$ . For a commuting contractive tuple of operators  $T$  acting on the Hilbert space  $\mathcal{H}$ , we associate the defect operators  $D_{T^*} = (1_{\mathcal{H}} - \sum_{i=1}^n T_i T_i^*)^{1/2}$  in  $\mathcal{B}(\mathcal{H})$  and  $D_T = (1_{\mathcal{H}^n} - T^* T)^{1/2} = ((\delta_{ij} 1_{\mathcal{H}} - T_i^* T_j))^{1/2}$  in  $\mathcal{B}(\mathcal{H}^n)$  with the corresponding defect spaces  $\mathcal{D}_{T^*} = \overline{\text{Ran} D_{T^*}} \subset \mathcal{H}$  and  $\mathcal{D}_T = \overline{\text{Ran} D_T} \subset \mathcal{H}^n$ . Also for  $z = (z_1, \dots, z_n) \in \mathbb{B}^n$ , define the commuting contractive tuple of operators  $Z = (z_1 1_{\mathcal{H}}, \dots, z_n 1_{\mathcal{H}})$  from  $\mathcal{H}^n$  to  $\mathcal{H}$  by  $Z(h_1, \dots, h_n) = z_1 h_1 + \dots + z_n h_n$ .

We define the characteristic function of  $T$  to be the analytic operator-valued function  $\theta_T : \mathbb{B}^n \rightarrow \mathcal{B}(\mathcal{D}_T, \mathcal{D}_{T^*})$  with

$$\theta_T(z) = -T + D_{T^*}(1_{\mathcal{H}} - ZT^*)^{-1} ZD_T.$$

Identifying this characteristic function as a multipliers on the Arveson space, we give a functional model for a pure commuting contractive tuple of operators. We prove that,

**THEOREM 1.** *Every pure commuting contractive tuple  $T$  on a Hilbert space  $\mathcal{H}$  is unitarily equivalent to the commuting tuple  $\mathbb{T} = (\mathbb{T}_1, \dots, \mathbb{T}_n)$  on the functional space  $\mathbb{H}_T = (H(\mathbb{C}) \otimes \mathcal{D}_{T^*}) \ominus M_{\theta_T}(H(\mathbb{C}) \otimes \mathcal{D}_T)$  defined by  $\mathbb{T}_i = P_{\mathbb{H}_T}(M_{z_i} \otimes 1_{\mathcal{D}_{T^*}})|_{\mathbb{H}_T}$  for  $1 \leq i \leq n$ .*

Using the above functional model, we prove that the characteristic function is a complete unitary invariant for pure tuple. More precisely

**THEOREM 2.** *Two pure commuting contractive tuples  $T$  and  $R$  on Hilbert spaces  $\mathcal{H}$  and  $\mathcal{K}$  are unitarily equivalent if and only if their characteristic functions coincide.*

This generalizes the well known theory of Sz.-Nagy and Foias [5] from a single contraction to pure commuting contractive tuple of operators. Also we relate the idea of characteristic function with the curvature invariant introduced by Arveson [2].

## Références

- [1] W. B. Arveson, *Subalgebras of  $C^*$ -algebras III, Multivariable operator theory*, Acta Math., (2) 181 (1998), 159-228.
- [2] W. Arveson, *The curvature invariant of a Hilbert module over  $\mathbb{C}[z_1, \dots, z_d]$* , J. Reine Angew. Math. 522 (2000), 173-236. 2003a :47013
- [3] T. Bhattacharyya, J. Eschmeier and J. Sarkar, *Characteristic function of a pure commuting contractive tuple*, to appear in Integral Equations Operator Theory.

- [4] J. Eschmeier and M. Putinar, *Spherical contractions and interpolation problems on the unit ball*, J. Reine angew. Math. 542 (2002), 219-236.
- [5] B. Sz.-Nagy and C. Foias, *Harmonic Analysis of Operators on Hilbert Space*, North-Holland, 1970.

**Yurii V. Selivanov**

**Title :** Homologically trivial Banach and topological algebras.

**Abstract :** In this talk, we shall review some old and new results on structural properties of some classes of homologically trivial Banach and locally convex algebras. These include : contractible algebras, algebras of global dimension zero and biprojective algebras. As is known, the simplest examples of contractible algebras are the full matrix algebras. The Cartesian product of an arbitrary family of full matrix algebras is contractible as well. There is a natural conjecture that an arbitrary contractible Arens-Michael algebra is topologically isomorphic to the Cartesian product of a certain family of full matrix algebras. This is established, at the moment, under some additional assumptions. Nevertheless, the main problem still remains open, even in the normed case. The class of biprojective algebras is much wider than the class of contractible algebras. The biprojectivity property can be expressed in terms of derivations :  $A$  is biprojective if and only if each continuous derivation of  $A$  with values in any  $A$ -bimodule  $X$  is determined by a multiplier. Assuming certain conditions, biprojective algebras can be represented as topological direct sums of topologically simple biprojective algebras. The latter are realized as tensor algebras generated by duality.

**Aydin Shahbazov**

**Title :** On eigensubspaces of wighted composition operator.

**Abstract :** we will consider weighted composition operators  $T : f \mapsto \varphi \cdot f \circ \sigma$

$\sigma$  acting on uniformly closed subspaces of space of continuous functions defined on compact Hausdorff space and will investigate their eigenfunctions. Also we have studied dimension of eigensubspaces of weighted composition operators when above subspaces have analytic structure.

**Philip Spain**

**Title :** Boolean algebras of projections

**Abstract :** Boolean algebras of projections on duals of separable Banach spaces have monotone completions.

**Serban Stratila**

**Title :**

**Abstract :**

**Seytek Tabaldyev**

**Title :** Some Banach Algebras of homological dimension two.

**Abstract :** By the known global dimension theorem of Helemskii (1972) the global homological dimension  $dgA$  of each infinite dimensional Banach function algebra  $A$  is always greater or equal two. It is shown that if  $\Omega$  is an infinite, metrizable, compact space such that some finite order iterated derived set of  $\Omega$  is empty, then the global dimension and the bidimension of the Banach algebra  $C(\Omega)$  are equal two.

**Ali Taghavi**

**Title :** Two Characterizations Ideals Of Operators On Hilbert Space And Applications.

**Abstract :** let  $H$  be a Hilbert space with  $\dim H > 1$ , let  $B(H)$  denote the algebras of all bounded linear operators on  $H$ . We show that if  $N \subset B(H)$  be a (linear) subspace and  $TA + AT \in N$ , or  $T^*A + A^*T \in N$ , for all  $A \in N$  and  $T \in B(H)$ . Then  $N$  is a two-sided ideal. Also if  $P$  is a seminorm satisfying  $P(T^2) \leq P(T)^2$  or  $P(T^*T) \leq P(T)^2$  for all  $T \in B(H)$ , then  $\ker P$  is a two-sided ideal and  $P$  is a constant multiply of a submultiplicative seminorm. In fact, we show that second cases is true for any \*-algebra  $A$ .

**Richard M. Timoney**

**Title :** Some formulae for the norms of elementary operators

**Abstract :** We present a formula for the norm of an elementary operator on a  $C^*$ -algebra that seems to be new. The formula involves (matrix) numerical ranges and a kind of geometrical mean for positive matrices, the tracial geometric mean, which seems not to have been studied previously and has interesting properties. In addition, we characterise compactness of elementary operators.

**Ivan Todorov**

**Title :** On some geometric characterisations of compact operators.

**Abstract :** Geometric characterisations of compact operators acting on Hilbert spaces and Hilbert modules, as well as of compact elements of  $C^*$ -algebras, will be presented in the talk.

**Vladimir Troitsky**

**Title :** Semitransitive subspaces of operators.

**Abstract :** A set  $S$  of linear maps on a vector space  $V$  is said to be semitransitive if for every non-zero vectors  $x$  and  $y$  in  $V$  there exists a map  $A$  in  $S$  such that either  $Ax=y$  or  $Ay=x$ . We will discuss this property as well as a few related properties. We will also consider multi-dimensional versions of semi-transitivity and its relation with  $k$ -transitivity. The special cases of  $S$  being a subspace, an algebra, or a semigroup will be considered.

**Tuerdebieke**

**Title :** On joint convexity of trace functions.

**Abstract :** We give a necessary and sufficient condition on the joint convexity of the trace function  $f(A, B) = \text{Tr}(A^p B^q)$ .

**Lyudmila Turowska**

**Title :**

**Abstract :**

**Hans-Olav Tylli**

**Title :** Composition operators on vector-valued harmonic functions and Cauchy transforms.

**Abstract :** I will describe recent joint work with J. Laitila (Helsinki), which characterizes the weak compactness of the composition operators  $f \rightarrow f \circ \varphi$  on the  $X$ -valued spaces  $h^p(X)$  of harmonic functions and the space  $CT(X)$  of Cauchy transforms. Here  $\varphi$  is an analytic self-map of the unit disk and  $X$  is a reflexive complex Banach space. This extends earlier results of Sarason (1990), respectively Cima and Matheson (1998), from the scalar-valued setting  $X = \mathbf{C}$ . The study of composition operators on some vector-valued spaces of analytic functions was initiated by Liu, Saksman and the author (1998). There are basically two competing approaches, which apply to vector-valued spaces of strong respectively weak type, and examples demonstrate that these types of vector-valued spaces differ from each other.

**Hamid Vaezi**

**Title :** On Some Weighted Composition Operators Of Nuclear Type

**Abstract :** In this article we first consider a weighted composition operator on the disc algebra  $A(D)$  (the uniform algebra of functions analytic on the open unit disc  $D$  and continuous on its closure) of the form

$$f \mapsto u \cdot f \circ \phi,$$

where  $u \in A(D)$ ,  $\phi \in A(D)$ ,  $|\phi| \leq 1$ , and study nuclearity of this operator and finite sums of such operators. Finally we investigate a nuclear weighted composition operator on polydisc algebra  $A(D^n)$  where

$$D^n = \{z = (z_1, z_2, \dots, z_n) \in C^n : |z_k| < 1, 1 \leq k \leq n\}.$$

**2000 Mathematics Subject Classification :** 47B38 .

**Keywords :** Weighted composition operators, Nuclear operators .

**Armando Villena**

**Title :** Applications of Kazhdan's property to automatic continuity.

**Abstract :** Let  $G$  be a compact group which has the strong Kazhdan's property and let  $\tau$  be an isometric representation of  $G$  on  $L^p(\mu)$  for some measure space  $(\Omega, \Sigma, \mu)$  and  $1 < \infty$ . We characterize the continuity of linear operators from  $L^p(\mu)$  which commute with translations and the property of  $\|\cdot\|_p$  being the unique norm (up to equivalence) on  $L^p(\mu)$  with respect to which all translations are continuous in terms of the finite-dimensionality of the subspace of all invariant functions.

**Maria Victoria Velasco**

**Title :** Continuity of dense range homomorphisms and spectral conditions.

**Abstract :** In 1950 Charles E. Rickart showed that if  $A$  and  $B$  are Banach algebras and  $B$  is strongly semisimple then every dense range homomorphism from  $A$  to  $B$  is automatically continuous. The aim of this talk is to study the role of the associativity in this setting. Note that the definition of either homomorphism or strong radical do not involve the associativity property explicitly so these notions can be formulated straightforwardly for non-necessarily associative algebras. Therefore our goal is to know if the associativity can be just removed from Rickart's theorem. Our approach will consist into carry on the associative technique to its maximum scope, clarifying at the same time what is going on in the associative case.

**Nina Volosova**

**Title :** Description of projective ideals in quantized algebras of continuous functions on compact spaces

**Abstract :** We consider  $C(\Omega)$  algebras as quantized algebras with respect to the minimal quantization and investigate conditions of projectivity of their closed ideals in the sense of the two quantum homology theories. It turns out that these conditions are the same as in the classical case : a closed ideal in  $C(\Omega)$  is a projective  $C(\Omega)$ - $\hbar$ -module (or  $C(\Omega)$ - $\overset{o}{\otimes}$ -module) if and only if its Gel'fand spectrum is paracompact.

**Taher Yazdanpanah**

**Title :** Problems Concerning Weak Amenability of Triangular Banach Algebras.

**Abstract :** Let  $\mathcal{A}$  and  $\mathcal{B}$  be Banach algebras and let  $\mathcal{X}$  be a Banach  $\mathcal{A}, \mathcal{B}$ - module. Let  $\tau = \begin{bmatrix} \mathcal{A} & \mathcal{X} \\ & \mathcal{B} \end{bmatrix}$  be the corresponding triangular Banach algebra. Forrest and Marcoux have studied the  $n$ -weak amenability of triangular Banach algebra. We extend their work and in particular we show that when  $\mathcal{A}$  has a bounded approximate identity and  $\mathcal{X}$  is essential, then  $\tau$  is weakly amenable if and only if  $\mathcal{A}$  and  $\mathcal{B}$  are weakly amenable.

**Wieslaw Zelazko**

**Title :** Ideals in F-algebras.

**Abstract :** An F-algebra is a complete metric topological algebra. The following topics will be discussed. (a) When an F-algebra has all one-sided ideals closed. b) When an F-algebra has dense finitely generated ideals (some results and open problems). (c) A construction of an F-algebra with all left and not all right ideals closed.

**Jaroslav Zemanek**

**Title :** Polynomials in quasinilpotent operators.

**Abstract** We intend to discuss the power boundedness and other related properties of polynomials in quasinilpotent operators. Joint work with D. Tsedenbayar.

**Yong Zhang**

**Title :** Left invariant means on weakly almost periodic functions on bicyclic semigroups.

**Abstract :** J. Duncan and I. Namioka showed in 1978 that the bicyclic semigroup on two generators, denoted by  $S_1 = \langle 1, p, q \mid pq = 1 \rangle$ , is amenable. It is readily seen that the bicyclic semigroups  $S_2 = \langle 1, a, b, c \mid ab = ac = 1 \rangle$  and  $S_{1,1} = \langle 1, a, b, c, d \mid ac = bd = 1 \rangle$  are not left amenable ; the latter is also not right amenable. In contrast, T. Mitchell proved in 1984 that both  $AP(S_2)$  and  $AP(S_{1,1})$  have an invariant mean. We show that  $S_2$  is in fact right amenable and that  $WAP(S_2)$  has a left invariant mean. The last result answers an open question regarding the relation between the left reversibility of a semigroup and the existence of a LIM on the space of weakly almost periodic functions on the semigroup. The topic is part of a joint work with A. T.-M. Lau.

**Ali Zohri**

**Title :** On eigensubspaces of weighted composition operator.

**Abstract :** we have considered weighted composition operator which acts on some Banach algebra of functions (analytic functions) and investigated there eigenfunctions and proved a theorem about dimension of eigensubspaces in general and special cases.