Abstracts

Rank, trace and determinant in Banach algebras: Generalized Frobenius and Sylvester Theorems
G. Braatvedt
University of Johannesburg

As a follow-up to a paper of Aupetit and Mouton, we consider the spectral definitions of rank, trace and determinant applied to elements in a general Banach algebra. We prove a generalization of Sylvester’s Determinant Theorem to Banach algebras and thereafter a generalization of the Frobenius Inequality.
This is a joint work with R. Brits and F. Schulz, University of Johannesburg.

Truncation and Spectral Variation in Banach Algebras
R. Brits
University of Johannesburg

Let $a$ and $b$ be elements of a semisimple, complex and unital Banach algebra $A$. Using subharmonic methods, we show that if the spectral containment $\sigma(ax) \subseteq \sigma(bx)$ holds for all $x \in A$, then $ax$ belongs to the bicommutant of $bx$ for all $x \in A$. Given the aforementioned spectral containment, the strong commutation property then allows one to derive, for a variety of scenarios, a precise connection between $a$ and $b$. The current paper gives another perspective on the implications of the above spectral containment which was also studied, not long ago, by J. Alaminos, M. Brešar et. al.
This is a joint work with C. Touré and F. Schulz, University of Johannesburg.

On Fréchet algebras with the dominating norm property
Tomasz Ciaś
Adam Mickiewicz University

A Fréchet space $E$ with a fundamental sequence $(\| \cdot \|_n)_{n \in \mathbb{N}}$ of seminorms has the property (DN) if there is a continuous norm $\| \cdot \|$ on $E$ such that for all $k \in \mathbb{N}$ there is $n \in \mathbb{N}$ and a constant $C > 0$ such that

$$\|x\|_k^2 \leq C \|x\| \|x\|_n$$

for all $x \in E$. Every norm $\| \cdot \|$ with this property is called a dominating norm on $E$. The property (DN) plays a key role in the structure theory of nuclear Fréchet spaces. In 1977 D. Vogt proved that a nuclear Fréchet space is isomorphic to a closed subspace of the space $s$ of rapidly decreasing sequences if and only if it admits a dominating norm. In the talk we consider Fréchet *-algebras $E$ with unit – called DN-algebras – admitting a dominating Hilbert norm $\| \cdot \|$ such that, in particular,

$$(xy, z) = (y, x^* z)$$

for all $x, y, z \in E$. This class seems to be interesting at least for two reasons. Firstly, many natural Fréchet algebras are DN-algebras, e.g., the algebras $C^\infty(M)$ of smooth functions on smooth compact manifolds and the algebras $C^\infty(\Omega)$ of smooth functions with uniformly continuous partial derivatives on open, bounded subsets of $\mathbb{R}^n$ with Lipschitz boundary. Secondly, it appears
that DN-algebras can be embedded (as closed *-subalgebras) in the non-commutative topological *-algebra \( L(s) \cap L(s') \), known also as the maximal \( O^* \)-algebra with domain \( s \).

**Factorization in commutative Banach algebras**  
H. G. Dales  
University of Lancaster

Let \( A \) be a commutative Banach algebra with a bounded approximate identity. Then the famous Cohen’s factorization theorem says that \( A \) factors, in the sense that each \( a \in A \) can be written as \( a = bc \), where \( b, c \in A \). In fact there are many different versions of ‘factorization’, and one can make an ordered list of these properties, in which each property implies the next one on the list. I would like to show that none of these implications can be reversed. In particular, I would like to do this by exhibiting suitable Banach function algebras or suitable maximal ideals in uniform algebras or suitable commutative, radical Banach algebra. It would be a bonus if the counter-examples were separable. Some of these examples were known and new examples (and some open questions) appear in joint work with Joel Feinstein (Nottingham) and Hung Le Pham (Victoria University of Wellington). I shall discuss these examples.

**Recent progresses on the local p-Ditkin sets**  
Antoine Derighetti  
Université de Lausanne

In analogy with the sets of local p-synthesis, considered by Herz in the seventies, and the classical theory of Ditkin sets developed for abelian locally compact groups by Calderon, Rudin, Reiter and Herz, I present recent progresses on the class of local p-Ditkin subsets of nonamenable locally compact groups.

**Joint Spectrum of Upper Triangular Banach Algebras**  
Ali Ebadian  
Payame Noor University

Let \( A \) be a Banach algebra and \((T_1, ..., T_n)\) be \( n \)-tuple in \((U_m(A))^n\). We investigate formula for joint (Harte) spectrum of \((T_1, ..., T_n)\) with respect to upper triangular matrices algebra \((U_m(A))\) and obtain condition such that joint spectrum of the \( n \)-tuple in \((U_m(A))^n\) equals with respect to \((U_m(A))\) and \( M_m(A) \). Also, We compare relation between joint geometric and joint/generalized spectral radius on these Banach algebras.

**References**

Reducibility of a special class of operators
on the Hilbert space $L^2$

YOUSEF ESTAREMI
Payame Noor university

In this talk we characterize the closed subspaces of $L^2(\mathcal{F})$ that reduce the operators of the form $E^A M_u$, in which $A$ is a $\sigma$- subalgebra of $\mathcal{F}$. Also, some necessary and sufficient conditions are provided for $L^2(\mathcal{B})$ to reduces $E^A M_u$, for the $\sigma$- subalgebra $B$ of $\mathcal{F}$.

About holomorphic functional calculus
on semigroups of bounded operators

JEAN ESTERLE
Université de Bordeaux

We will have a fresh look on holomorphic functional calculus on semigroups in the very general framework of semigroups which are weakly continuous with respect to an "Arveson pair" $(X,X^*)$. We introduce the Arveson ideal I associated to the semigroup and the algebras $QM(I)$ (resp. $QMr(I)$) of quasimultipliers (resp. regular quasimultipliers) on I. The algebra $QMr(I)$ is an inductive limit of Banach algebras, and the generator $A$ of the semigroup can be interpreted as an element of $Q(I)$. The functional calculus associated to bounded holomorphic functions on suitable open set $U$ such that $-U$ contains the Arveson spectrum of $A$ takes values in $QMr(I)$, and so may take some values which do not represent bounded operators, but this functional calculus works for bounded operators not necessarily bounded at the origin. The usual Hinfinity functional calculus for sectorial operator can be formulated in this framework. This work makes use of the theory of regular quasimultipliers developed by the author in the Proceedings of the Conference on Banach algebras and Applications organized in 1981 at Long Beach.

This is a joint work with Isabelle Chalendar and Jonathan Partington.

Classes of Operator Multipliers

ÄSE FAHLANDER
Chalmers University of Technology

Operator multipliers is a non-commutative version of Schur multipliers which was introduced by Kissin and Schulman. They are elements of the minimal tensor product of two $C^*$-algebras which satisfy certain boundedness conditions depending on a pair of representations of the $C^*$-algebras. I will give the background and definition of these objects, including a proposed extension of the definition. I will give some examples to motivate this extension and show how some important previously known results carries over to the extended definition. This includes a classification result and a connection between operator multipliers and complete boundedness of certain maps; the latter is a very useful for studying these objects. Finally I will state some results about what the classes of operator multipliers look like for certain types of algebras.
Highlights in the theory of some unbounded operator algebras

M. FRAGOULOPOULOU
University of Athens

We shall define Allan’s generalized $B^*$–algebras (for short $GB^*$–algebras), that extend classical $C^*$–algebras in the context of locally convex $^*$–algebras. After discussing main examples and main features of these algebras, we shall point out some of the most important results in their theory. Most precisely, (1) there is an algebraic commutative Gelfand–Naimark type theorem (Allan), where the ‘partial characters’ of the $GB^*$–algebra involved may also take the value $\infty$. (2) There is an algebraic non–commutative Gelfand–Naimark type theorem (Dixon), where the operators that realize the given $GB^*$–algebra are unbounded. (3) Given a $C^*$–algebra $\mathcal{A}[\| \cdot \|]$ and a locally convex $^*$–algebra topology $\tau$ on $\mathcal{A}$, coarser than the $C^*$–norm topology, the completion $\hat{\mathcal{A}}[\tau]$ of $\mathcal{A}$ with respect to $\tau$ is a $GB^*$–algebra over the $\tau$–closure $B_\tau$ of the unit ball of the given $C^*$–algebra $\mathcal{A}[\| \cdot \|]$ (F.–Inoue–Kürsten). (4) Two $GB^*$–topologies $\tau_1$, $\tau_2$ on a given locally convex $^*$–algebra are equivalent in a sense strictly related with the “core” of the structure of the respective $GB^*$–algebras (Allan, Dixon), a result similar to the uniqueness of the $C^*$–norm in a $C^*$–algebra.

$GB^*$–algebras occur among the so–called ‘unbounded Hilbert algebras’ that are very important for the Tomita–Takesaki theory for unbounded operator algebras developed by A. Inoue. They also contribute to the rising of the extended $W^*$–algebras (Dixon, Inoue), that also play a decisive role in the unbounded Tomita–Takesaki theory.

Function and operator algebras on locally compact groups

JORGE GALINDO
University of Castellon

The Harmonic Analysis and the Representation Theory of locally compact groups are encoded in a number of function algebras of algebras of operators: group $C^*$–algebras, measure algebras or group von Neumann algebras can be quoted among the latter; Fourier algebras, Fourier-Stieltjes algebras or the algebras of (weakly) almost periodic functions are among the former. In this series of lectures we will revisit the descriptions of these algebras, establish a few of their relations and peek into some open problems, mainly in connection with the behaviour of Arens products on their biduals.

Completing an incomplete result of B. E. Johnson and approximate semi-amenability

FEREIDOUN GAHGRAMANI
University of Manitoba

In 1996, B.E. Johnson proved that if the projective tensor product $A \hat{\otimes} B$ of the Banach algebras $A$ and $B$ is amenable and $B$ satisfies a certain condition, then $A$ is amenable. In this talk, first I will show that the result is true without any additional assumption on $B$. In the course of resolving this problem – and the corresponding problem for approximate amenability – we were led to study certain kind of derivations which we call them semi-inner derivations. We also introduce a concept of approximate semi-amenability for Banach algebras and show that certain classes of Banach algebras – which are known not to be approximately amenable – are in fact approximately semi-amenable. This is joint work with Richard J. Loy.
The numerical range of compressions of the shift operator

PAMELA GORKIN
Bucknell University

The numerical range of an operator $T$ on a Hilbert space $H$ is defined by $W(T) = \{\langle Tx, x \rangle : x \in H, \|x\| = 1 \}$. The numerical range is interesting not only because of the information it contains about the operator, but also because of its geometry and function theoretic connections. In this talk, we focus on operators that are compressions of the shift operator to certain Hilbert spaces known as model spaces. Even for finite dimensions, complete descriptions of the numerical range of an operator are difficult to obtain. We discuss some attempts at these descriptions as well as some open questions in this area.

$p$-Multi-normed spaces, based on non-discrete measures, and their tensor products

ALEXANDER HELEMSKII
Moscow State University

It was A. Lambert who discovered a new type of structures, situated, in a sense, between normed spaces and (abstract) operator spaces. His definition was based on the notion of amplification a normed space by means of spaces $\ell^n_2$. Afterwards several mathematicians investigated more general structure, “$p$-multi-normed space”, introduced with the help of spaces $\ell^n_p$: $1 \leq p \leq \infty$.

In the present paper we pass from $\ell^n_p$ to $L^n_p(X, \mu)$ with an arbitrary measure. This happened to be possible in the frame-work of the non-coordinate (“index-free”) approach to the notion of amplification, equivalent in the case of a discrete counting measure to the approach in mentioned articles.

Two categories arise. One consists of amplifications by means of an arbitrary normed space, and another one consists $p$–convex amplifications by means of $L^n_p(X, \mu)$. Each of them has its own tensor product of its objects whose existence is proved by a respective explicit construction. As a final result, we show that the “$p$–convex” tensor product has especially transparent form for the so-called minimal $L^n_p$–amplifications of $L^n_q$–spaces, where $q$ is the conjugate of $p$. Namely, tensoring $L^n_q(Y, \nu)$ and $L^n_q(Z, \lambda)$, we get $L^n_q(Y \times Z, \nu \times \lambda)$.

Beurling-Fourier algebras on Lie groups and their spectra

HUN HEE LEE
Seoul National University

We investigate Beurling-Fourier algebras, a weighted version of Fourier algebras, on various Lie groups focusing on their spectral analysis. We will introduce a refined general definition of weights on the dual of locally compact groups and their associated Beurling-Fourier algebras. Constructions of nontrivial weights will be presented focusing on the cases of representative examples of Lie groups, namely $SU(n)$, the Heisenberg group $H^n$, the reduced Heisenberg group $H^n$, the Euclidean motion group $E(2)$ and its simply connected cover $E(2)$ and the $ax + b$ group. We will determine the spectrum
of Beurling-Fourier algebras on each of the aforementioned groups emphasizing its connection to the complexification of underlying Lie groups. We also demonstrate “polynomially growing” weights does not change the spectrum and show the associated regularity of the resulting Beurling-Fourier algebras. This is a joint work with Mahya Ghandehari, Jean Ludwig, Nico Spronk and Lyudmila Turowska.

Set Amenability of Banach Algebras with Applications in Group and Semigroup Algebras

Ali Jabbari
Payame Noor University

In this paper, we introduce a concept of amenability for an arbitrary subset \(P\) of a Banach Algebra \(A\) that we call it \(P\)-amenability and for every subset of \(A\) we call it, set-amenability. This new notion is a generalization of set-amenability for semigroups that was introduced in [1]. We characterize set-amenability of Banach algebras by several equivalent statements which are analogues of properties characterizing amenable Banach algebras.

References


Isomorphisms between the left uniform compactification of locally compact groups

Safoura Jafar-Zadeh
University of Besançon

For a locally compact group \(G\), let \(C_b(G)\) be the space of all complex-valued, continuous and bounded functions on \(G\) equipped with the sup-norm, and \(LUC(G)\) be the subspace of \(C_b(G)\) consisting of all functions \(f\) such that the map \(G \to C_b(G); x \mapsto l_x f\) is continuous, where \(l_x f\) is the function defined by \(l_x f(y) = f(xy)\), for each \(y \in G\). The subspace \(LUC(G)\) forms a unital commutative \(C^*\)-algebra. We can induce a multiplication on the Gelfand spectrum of \(LUC(G)\), \(GLUC\), with which \(GLUC\) forms a semigroup. In this talk, I study some properties of \(GLUC\), the so called right topological semigroup compactification of \(G\). I also discuss the question of when the corona, \(GLUC \setminus G\), determines the underlying topological group \(G\).

Arens-Michael envelopes of Ore extensions

Petr Kosenko
Higher School of Economics, Moscow

An Arens-Michael algebra is a complete locally convex algebra whose topology can be defined by a family of submultiplicative seminorms. Thus Arens-Michael algebras generalize the notion of a Banach algebra. It turns out that the forgetful functor from the category of Arens-Michael algebras to the category of algebras admits a left adjoint: the resulting functor is called the Arens-Michael envelope. In my talk I will present some of the most interesting examples of the Arens-Michael envelopes of different associative algebras. In particular, in this talk I hope to cover the computation of the
Arens-Michael envelopes of Ore extensions (and Laurent extensions). Methods, which are used in this computation, give us a possible approach to compute the Arens-Michael envelope of $U_q(\mathfrak{sl}_2)$ for $|q| \neq 1$.

**Gleason parts of bidual algebras**

Marek Kosiek

University of Kraków

Canonical images of Gleason parts of a uniform algebra $A$ in its second dual $A^{**}$ are studied. We consider their topological properties and relation with Gleason parts of $A^*$ Gleason parts of bidual algebras.

**Duals of quantum semigroups with involution**

Yulia Kuznetsova

University of Besançon

We define a category $QSI$ of quantum semigroups with involution which carries a corepresentation-based duality map $M \mapsto \hat{M}$. Objects in $QSI$ are von Neumann algebras with comultiplication and coinvolution, we do not suppose the existence of a Haar weight or of a distinguished spatial realisation. In the case of a locally compact quantum group $G$, the duality $^\wedge$ in $QSI$ recovers the universal duality of Kustermans: $L^\infty(\hat{G}) = C_0^u(\hat{G})^{**} = C_0^u(G)^{**}$, and $L^\infty(\hat{G}) = C_0^u(G)^{**} = C_0^u(\hat{G})^{**}$. If $G$ is a locally compact group and $P$ its semigroup compactification, then $C(P)^{**} = C(bG)^{**}$, where $bG$ is the Bohr compactification of $G$. Other examples are given.

**The norm-preserving extension property in the symmetrized bidisc $\Gamma$ and von Neumann-type inequalities for $\Gamma$-contractions**

Zinaida Lykova

Newcastle University

A set $V$ in a domain $U$ in $\mathbb{C}^n$ has the norm-preserving extension property if every bounded holomorphic function on $V$ has a holomorphic extension to $U$ with the same supremum norm. We describe all algebraic subsets of the symmetrized bidisc $G \overset{\text{def}}{=} \{(z + w, zw) : |z| < 1, \ |w| < 1\}$ which have the norm-preserving extension property. In contrast to the case of the ball or the bidisc, there are sets in $G$ which have the norm-preserving extension property, but are not holomorphic retracts of $G$. We give applications to von Neumann-type inequalities for $\Gamma$-contractions (that is, commuting pairs of operators for which the closure of $G$ is a spectral set) and for symmetric functions of commuting pairs of contractive operators.

The talk is based on joint work with Jim Agler and Nicholas Young.

Splittings of extensions of the algebra of bounded operators on a Banach space

Niels Jacob Laustsen
Lancaster University

By an extension of a Banach algebra $B$, we understand a short-exact sequence of the form

$$\{0\} \longrightarrow \ker \varphi \longrightarrow A \xrightarrow{\varphi} B \longrightarrow \{0\},$$

where $A$ is a Banach algebra and $\varphi: A \rightarrow B$ is a continuous, surjective algebra homomorphism. The extension splits algebraically (respectively, splits strongly) if $\varphi$ has a right inverse which is an algebra homomorphism (respectively, a continuous algebra homomorphism).

Bade, Dales and Lykova (Mem. Amer. Math. Soc. 1999) carried out a comprehensive study of extensions of Banach algebras, focusing in particular on the following automatic-continuity question: For which (classes of) Banach algebras $B$ is it true that every extension of $B$ which splits algebraically also splits strongly?

In the case where $B = B(E)$ is the algebra of bounded operators on a Banach space $E$, Bade, Dales and Lykova recorded some partial positive results, but left the general question open. We shall show that the answer is negative, even if one strengthens the hypothesis to demand that the extension is admissible in the sense that $\ker \varphi$ is complemented in $A$ as a Banach space. The Banach space $E$ that we use is a quotient of the $\ell^2$-direct sum of an infinite sequence of James-type quasi-reflexive Banach spaces; it was originally introduced by Read (J. London Math. Soc. 1989).

The talk is based on joint work with Richard Skillicorn and Tomasz Kania; see arxiv:1409.8203, arxiv:1602.08963, arxiv:1603.04275.

Pointwise Connes amenability of dual Banach algebras

A. Mahmoodi
Islamic Azad University

We shall define and study the notions of pointwise Connes amenability and pointwise $w^*$-approximate Connes amenability for dual Banach algebras. It is shown that in general these concepts are distinct. We shall discuss these properties for the Banach sequence algebras $\ell^1(\omega)$ and for the weighted semigroup algebras $\ell^1(N_\Lambda, \omega)$.

Keywords: Connes-amenability, approximate amenability, Beurling algebras, pointwise Connes amenability.

Sheaf cohomology for $C^*$-algebras

Martin Mathieu
Queen’s University Belfast

I will report on joint work in progress with Pere Ara (Barcelona) in which we aim to develop a full sheaf cohomology theory for $C^*$-algebras. To this end, we introduce a certain exact structure for categories of sheaves of operator modules over sheaves of $C^*$-algebras. Exact structures, in the sense of Quillen, can be used to mimic Homological Algebra techniques, which usually are only available in abelian categories, in the more general setting and have proven useful in other functional analytic situations already.
Tame functions on topological groups
and generalized (extreme) amenability

Michael Megrelishvili
Bar-Ilan University

We study the algebra $\text{Tame}(G)$ of tame functions on topological groups motivated by works of Pym, K"ohler, Glasner and Rosenthal. We say that a right uniformly continuous bounded function $f : G \to \mathbb{R}$ is tame if the orbit $fG$ does not contain an independent subsequence. By a result of Glasner and myself it is equivalent to the condition that $f$ is a matrix coefficient of a continuous isometric representation of $G$ on a Rosenthal Banach space $V$ (i.e. $V$ does not contain an isomorphic copy of $l_1$). A compact $G$-system $X$ is said to be tame if $fG$ does not contain an independent subsequence for every continuous function $f : X \to \mathbb{R}$.

A topological group $G$ is:

(i) **intrinsically tame** if every continuous action of $G$ on a compact space $X$ admits a compact $G$-subsystem $Y \subset X$ which is tame.

(ii) **convexly intrinsically tame** if every continuous affine action of $G$ on a compact affine space $X$ admits a compact $G$-subsystem $Y \subset X$ which is tame.

We will present some examples of topological groups which are intrinsically tame but nonamenable. As well as examples of locally compact nonamenable and not intrinsically tame groups which are convexly intrisicaly tame. If the time permits we are going also to discuss some open questions. This is a joint (submitted) work with Eli Glasner (Tel Aviv University).

**On pseudo-amenability of $C(X, A)$ for norm irregular $A$.**

O.T. Mewomo
University of Kwazulu-Natal

Let $X$ be a compact Hausdorff space, we show that for a norm irregular Banach algebra $A$ with a bounded approximate identity, if $A$ has an approximate diagonal which is bounded with respect to the multiplier norm on $\hat{A} \hat{\otimes} A$, then $C(X, A)$ has an approximate diagonal.

This is a joint work with U.O. Adiele.

**2010 Mathematics Subject Classification.** 46H20, 46H10, 46H25.

**Keywords and phrases.** Compact Hausdorff space, Banach algebra, pseudo-amenability, approximate diagonal, norm irregular.

**References**


Fredholm theory in ordered Banach algebras
Sonja Mouton
Stellenbosch University

The study of Fredholm theory in general Banach algebras was initiated in 1982 by Robin Harte in [2], while spectral theory in general ordered Banach algebras originated in the mid-nineties — see [4]. In order to find the connections between Fredholm theory and positivity, we study the upper Weyl spectrum $\omega^+_T(a) = \cap \{ \sigma(a + c) : c \in C \cap N(T) \}$ and the upper Browder spectrum $\beta^+_T(a) = \cap \{ \sigma(a + c) : c \in C \cap N(T), \ ac = ca \}$ of an element $a$ in an ordered Banach algebra $A$ with algebra cone $C$ relative to a fixed homomorphism $T$ (with null space $N(T)$) defined on $A$. The first concept was introduced in the operator context by Egor Alekhno in [1]. If the homomorphism $T$ has closed range and the Riesz property, then the connected hulls of the Fredholm, Weyl and Browder spectra all coincide — see [3]. In addition, it can be shown that under certain natural conditions, even the connected hull of the upper Weyl spectrum can be added to this list. However, this is not the case for the connected hull of the upper Browder spectrum. Motivated by this observation, we are led to study conditions under which the spectral radius of a positive element $a$ lying outside the Fredholm spectrum of $a$ will be outside the upper Browder spectrum of $a$ as well. This property is referred to as the upper Browder spectrum property.

This talk is based on joint work with Ronalda Benjamin.

References

Recent Advances on Topological Centres and Related Topics
Matthias Neufang
University of Carleton

We present an overview of some of our work on topological centres associated with Banach algebras, semigroup compactifications, and group actions. We shall also discuss related topics such as the structure of module maps on the dual of a Banach algebra $A$, and invariant means. Our results include solutions to several problems raised in the literature:

• Csíkszár’s conjecture (1971) on the topological centre of $\text{LUC}(G)^*$ for general topological groups (solved for all separable $G$, jointly with Ferri);
• the Ghahramani-Lau conjecture (1994/95) on the topological centre of the bidual of the measure algebra (jointly with Losert-Pachl-Steprâns);
• questions of Lau-Ülger (1996, 2014) on the structure of module maps on $A^*$ stemming from topological centre elements (jointly with Hu-Ruan), and of natural and invariant projections on $A^*$;
• a question of Dales (2007) on small dtc sets, i.e., determining for the topological centre (jointly with Ferri-Pachl);
• the Farhadi-Ghahramani multiplier problem (2007);
• questions of Dales-Lau-Strauss and Daws (2011/12) on topological invariant means on weakly almost periodic functionals.

**Spectral theory of Fourier-Stieltjes algebras**

**PRZEMYSŁAW OHRYSKO**

**Institute of Mathematics of Polish Academy of Sciences**

My talk is devoted to presentation of the most important results from a joint work with Mateusz Wasilewski concerning spectral properties of Fourier-Stieltjes algebras available on arXiv.org with identifier: 1705.05457. It is an extensive project including research on elements and Gelfand spaces of the discussed algebras. The most significant topics are concentrated around the notion of the spectrum of an element in a relation to an image of a function on a group which leads to the notion of the naturality of the spectrum and Wiener-Pitt phenomenon (for non-commutative groups). A lot of other pathologies can be transferred from the commutative case but some problems do not have the classical counterparts which is caused by the non-commutativity of group $C^*$-algebras. The subject matter is very broad and the most of the results will be outlined only. Nevertheless I will try to present in an accessible way the differences between the world of measures on commutative (locally compact) groups and Fourier-Stieltjes algebras (for now only for discrete groups).

**A characterization of C*-normed algebras via positive functionals**

**LOURDES PALACIOS**

**Universidad Autónoma Metropolitana**

A functional $f$ on an involutive algebra $E$ is positive if $f(xx^*) \geq 0$ for all $x \in E$. It is known that $C^*$-algebras always have a large supply of positive functionals. There is even the following result:

Let $(E, \|\|)$ be a unital $C^*$-algebra. Then, for every $z \in E$, there is a positive functional $f$ such that $f(e) = 1$ and $f(zz^*) = \|z\|^2$.

In this talk we note that in fact this is a property that characterizes $C^*$-algebras in the frame of involutive Banach algebras; moreover, the same situation is examined in some normed and non normed topological algebras. This is done through the existence of enough specific positive functionals.

**Some $A(G)$-module homomorphisms**

**GERHARD RACHER**

**University of Salzburg**

We show that a lc group is discrete if (and only if) there is a nonzero $A(G)$-linear bounded operator from its von Neumann algebra $L(G)$ into its Fourier algebra $A(G)$.
Radius preserving regularities (semiregularities) in Banach algebras

H. RAUBENHEIMER
University of Johannesburg

We investigate regularities (semiregularities) \( R \) and \( S \) in a Banach algebra \( A \) satisfying \( S \subset R \) and the corresponding spectra \( \sigma_S \) and \( \sigma_R \) satisfying

\[
\sup\{|\lambda| : \lambda \in \sigma_R(a)\} = \sup\{|\lambda| : \lambda \in \sigma_S(a)\}
\]

for all \( a \in A \).

Wittstock moduli of elementary operators and their application to “generalized notions of amenability”

VOLKER RUNDE
University of Alberta

Let \( \mathfrak{A} \) be a \( C^* \)-algebra, and let \( T : \mathfrak{A} \to \mathcal{B}(\mathcal{H}) \) be completely bounded. We call \( |T| : \mathfrak{A} \to \mathcal{B}(\mathcal{H}) \) a Wittstock modulus of \( \mathfrak{A} \) if \( |T| \) is completely positive such that \( |||T|||_{cb} \leq |||T|||_{cb} \) and \( |T| \pm \text{Re} T \geq 0 \) and \( |T| \pm \text{Im} T \geq 0 \). As a consequence of G. Wittstock’s celebrated decomposition theorem, every completely bounded operator has a Wittstock modulus. We give a concrete description of Wittstock moduli of elementary operators and put it to work towards settling the question of whether a pseudo- or approximately amenable \( C^* \)-algebra is actually amenable.

TRO actions and crossed products

PEKKA SALMI
University of Oulu

A contractive measure on a locally compact group or quantum group \( G \) determines a convolution operator on \( L^\infty(G) \), and the fixed point space of the convolution operator gives rise to a ternary ring of operators (TROs). In fact, if the measure is an idempotent, the image of the convolution operator is a sub-TRO of the von Neumann algebra \( L^\infty(G) \). In general, one has to apply a Choi–Effros type construction, now based on a result of Youngson on completely contractive projections, to define a \( W^* \)-TRO structure on the fixed point space. In this talk, we discuss such TROs arising in abstract harmonic analysis. These may be considered as non-positive analogues of non-commutative Poisson boundaries introduced by Izumi. Kalantar, Neufang and Ruan described certain non-commutative Poisson boundaries as crossed products, and considering the same in the case of contractive measures leads to a study of actions of locally compact groups and quantum groups on \( W^* \)-TROs and related crossed products. The results generalise those for von Neumann algebraic actions. The talk is based on joint work(s) with Adam Skalski, Matthias Neufang and Nico Spronk.

Twisted Orlicz algebras

EBRAHIM SAMEI
University of Saskatchewan

Let \( G \) be a locally compact group, let \( \Omega : G \times G \to \mathbb{C}^* \) be a 2-cocycle, and let \( (\Phi, \Psi) \) be a complementary pair of strictly increasing continuous Young functions. In this talk, we consider the Orlicz space \( L^\Phi(G) \) and investigate its algebraic property under the twisted convolution \( \oplus \) coming from \( \Omega \). We find sufficient conditions under which \( (L^\Phi(G), \oplus) \) becomes a Banach algebra or a Banach \(*\)-algebra; we call it a twisted Orlicz algebra. We show that under suitable condition on \( \Omega \), \( (L^\Phi(G), \oplus) \) becomes both a symmetric Banach \(*\)-algebra and an Arens regular, dual Banach algebra.
We also look into certain cohomological properties of \((L^\Phi(G), \otimes)\), namely amenability and Connes-amenability, and show that they rarely happen. We apply our methods to compactly generated group of polynomial growth and demonstrate that our results could be applied to variety of cases. This is a joint work with Serap Öztop (Istanbul University).

**Approximate Identities, Factorization, and Amenability in Algebras of Random Elements**

Bert Schreiber

Wayne State University

We will discuss the topics in the title for algebras \(L_0(\Omega; A)\), \(A\) a Banach algebra.

**Rank in Banach Algebras: A Generalized Cayley-Hamilton Theorem**

F. Schulz

University of Johannesburg

Let \(A\) be a semisimple Banach algebra with non-trivial, and possibly infinite-dimensional socle. Addressing a problem raised by R.E. Harte and C. Hernández, we first define a characteristic polynomial for elements belonging to the socle, and we then show that a Generalized Cayley-Hamilton Theorem holds for the associated polynomial. The key arguments leading to the main result follow from the observation that a purely spectral approach to the theory of the socle carries alongside it an efficient method of dealing with relativistic problems associated with infinite-dimensional socles. This is a joint work with R. Brits and G. Braatvedt, University of Johannesburg.

**Weak amenability of central Beurling algebras**

Varvara Shepelska

University of Saskatchewan

Let \(G\) be a locally compact group and \(\omega\) be a weight on \(G\). The central Beurling algebra \(ZL^1(G, \omega)\) is the center of the weighted group algebra \(L^1(G, \omega)\). Naturally, \(ZL^1(G, \omega)\) is a commutative Banach algebra and it is non-trivial if and only if \(G\) is an [IN] group.

In this talk I am going to present the results on weak amenability of \(ZL^1(G, \omega)\) obtained with Y. Zhang in [1]. They naturally extend the characterization of weak amenability for commutative Beurling algebras \(L^1(G, \omega)\) from [2]. We establish a necessary condition for weak amenability of \(ZL^1(G, \omega)\) on \([FC]^\sim\) groups \(G\), and a sufficient condition on \([FD]\) groups \(G\). In particular, for a compactly generated \([FC]^\sim\) group with the polynomial weight \(\omega_\alpha(x) = (1 + |x|)^\alpha\), we show that \(ZL^1(G, \omega_\alpha)\) is weakly amenable if and only if \(\alpha < 1/2\).

**References**


Idempotents, topologies and ideals

NICO SPRONK
University of Waterloo

Given a topological group $G$ we exhibit a bijective correspondence between
• certain weakly almost periodic topologies on $G$,
• idempotents in the weakly almost periodic compactification of $G$
• complemented, translation-invariant ideals in the algebra $W(G)$ of weakly almost periodic functions on $G$.

The latter give decompositions which generalize the classical decomposition of $W(G)$ into almost periodic and weakly mixing functions. The idempotents give us a tool with which we may simultaneously understand many classical decompositions of weakly almost periodic representations. We also generalize a result of Bergelson and Rosenblatt characterizing weakly mixing vectors in many such representations. We will give an application to Fourier-Stieltjes algebras.

Multiplicative Maps into the Spectrum

C. TOURÉ
University of Johannesburg

We consider the converse of a famous result of W. Żelazko et.al. which characterizes multiplicative functionals amongst the dual space members of a complex unital Banach algebra $A$. Specifically, we address the possibility of a continuous multiplicative map $\phi : A \to \mathbb{C}$ with values $\phi(x)$ belonging to the spectrum of $x$, being linear. Our main result states, if $A$ is a $C^{*}$-algebra, then $\phi$ always generates a corresponding character $\psi_{\phi}$ of $A$. It is then shown that $\phi$ shares many linear properties with its induced character. Moreover, if $A$ is a von Neumann algebra, then it turns out that $\phi$ itself is linear, and that it corresponds to its induced character.

This is a joint work with R. Brits and F. Schulz, University of Johannesburg.

Hypercyclic properties of commutator maps

HANS-OLAV TYLLI
University of Helsinki

I will describe recent results related to the problem whether there is a bounded operator $A \in \mathcal{L}(\ell^2)$, so that the associated commutator map $S \mapsto \Delta_A(S) = AS - SA$ is hypercyclic on the ideal $K(\ell^2)$ consisting of the compact operators on $\ell^2$, or on other separable Banach ideals of $\mathcal{L}(\ell^2)$. Recall that for the separable Banach space $X$ the bounded operator $T : X \to X$ is hypercyclic if there is a vector $x \in X$ such that the orbit of $x$ under $T$ is dense, that is

$$\{T^nx : n \geq 0\} = X.$$ 

Our main result shows that the commutator map $\Delta_{cB}$ is not hypercyclic on $K(\ell^2)$ for any constant $c$, where $B \in \mathcal{L}(\ell^2)$ is the back-ward shift.

This talk is based on joint work with Clifford Gilmore and Eero Saksman, Helsinki.
The Jacobson Radical of the Bidual of a Beurling Algebra

Jared White
Lancaster University

We discuss the Jacobson radical of the bidual of a Beurling algebra on a discrete group, considered as a Banach algebra with the first Arens product, asking, for example, whether it is always non-zero. In particular this is the case whenever the underlying group is \( \mathbb{Z} \), answering a question of Dales and Lau.

On Ward Compact Operators on Banach spaces

A. Zohri
Payame Noor University

The aim of this paper is considering properties of quasi Cauchy sequences and introducing the new concept, Ward compact Operators as a generalization of compact operators and investigate their properties. Ward compact operators are defined using properties of quasi Cauchy sequences rather than Cauchy sequences. Ward continuity of ward compact operators is considered and similar to compact operators we prove a ward compactness criterion for this operators.

REFERENCES

[1] David Burton and John Coleman, Quasi-Cauchy sequences, American mathematical monthly