

ABSTRACTS OF TALKS

(1) **Johan F. Aarnes**, Norwegian University of Science and Technology, Trondheim, Norway 7034, E-mail: Trondheim aarnes@math.niu.edu QUASI-MEASURES - WHERE DO THEY COME FROM?

ABSTRACT: Let X be a compact Hausdorff space. A quasi-measure is an additive, monotone, positive and regular set-function which is defined on the class of sets in X that are either open or closed. Any quasi-measure which is subadditive extends to a regular Borel-measure. The interest centers around the non-trivial quasi-measures, i.e. those that are not subadditive. This is a very large class of set-functions with many surprising properties. Any quasi-measure gives rise to a non-linear integral, a quasi-integral. The talk will address the problem of obtaining a deeper understanding of what quasi-measures really are, and where they come from. It turns out that much can be gained by looking at certain set-functions defined on finite sets of integers. These set-functions will be called "super-measures", simply because they are superadditive: the measure of a union of two disjoint sets is always larger than or equal to the sum of the measures of the two sets. It will be shown how a supermeasure determines a quasimeasure in X , and more generally how all quasimeasures may be obtained from supermeasures in the Stone-Cech compactification of the natural numbers.

(2) **Paul Abraham**, Kent State University, Stark Campus, Canton, Ohio 44720, USA, E-mail: pabraham@stark.kent.edu and **John Alexopoulos**, Kent State University, Stark Campus, Canton, Ohio 44720, USA, E-mail: jalexopoulos@stark.kent.edu ON CONVERGENCE OF THE ARITHMETIC MEANS OF MARTINGALE DIFFERENCE SEQUENCES

ABSTRACT: We will discuss some convergence results for the arithmetic means of bounded martingale difference sequences in L_p -spaces, $p > 1$, or in a special class of non-reflexive Orlicz spaces. The results will be related to some classical results of Banach and Saks, Gaposhkin and Komlos.

(3) **Yuri A. Abramovich**, Indiana University - Purdue University Indianapolis, Indianapolis, IN 46202, E-mail: yabramovich@math.iupui.edu D-BASES AND THEIR PROPERTIES

ABSTRACT: Let $T : X \rightarrow X$ be a bijective disjointness preserving operator on a Dedekind complete vector lattice, in particular, on an ideal function space. The long standing problem whether or not the inverse operator T^{-1} is also disjointness preserving has been recently solved in the negative by A. Kitover and the author. A key element in solving this problem is the concept of a d-basis. This concept is an order oriented modification of the concept of a Hamel basis, and in our talk we will present a survey of results dealing with d-bases.

(4) **Maria D. Acosta**, University of Granada, Granada 18071, Spain, E-mail: dacosta@goliat.ugr.es, NORM ATTAINING OPERATORS INTO $L_1(\mu)$

ABSTRACT: There is a Banach space X such that the set of norm attaining operators from X to any infinite-dimensional space $L_1(\mu)$ is not dense. In case that the measure μ is not purely atomic, we can use as X a suitable predual of a Lorentz space.

(5) **Pietro Aiena**, University of Palermo, 90123 Palermo, Italy, E-mail: paiena@mbox.unipa.it SOME REMARKS ON THE WEYL-BROWDER SPECTRA OF A MULTIPLIER

ABSTRACT: The Browder spectrum of a bounded operator $T \in L(X)$ on a Banach space X is obtained by deleting from the ordinary spectrum $\sigma(T)$ only the Fredholm points which are isolated in $\sigma(T)$. K. Laursen raised the question whenever the Browder spectrum of a multiplier T of a semi-simple commutative Banach algebra may be characterized as the largest subset of the spectrum which remains invariant under perturbations by Riesz multipliers. We show, together other related results, that the answer to this question is always positive.

(6) **John Akeroyd**, University of Arkansas, Fayetteville, Arkansas 72701, USA,

E-mail: jakeroyd@comp.uark.edu HARMONIC MEASURES ON THE DISK WITH MULTIPLE SLITS

ABSTRACT: For any subregion G (of the unit disk) whose outer boundary is the unit circle, we show that there is a sequence of pairwise disjoint rectifiable arcs in G , only finitely many of which are contained in any compact subset of the unit disk, such that harmonic measure for the disk minus these arcs has no mass on the unit circle. We also discuss whether or not the arcs can be chosen so that the sum of their lengths is finite. An application concerning polynomial approximation is considered.

(7) **Roko Aliprantis**, Krannert Graduate School of Management, Purdue University, West Lafayette, Indiana 47907, USA, E-mail: aliprantis@mgmt.purdue.edu A FUNCTIONAL ANALYTIC VIEW OF ECONOMIC EQUILIBRIUM

ABSTRACT: The classical Arrow-Debreu model of General Economic Equilibrium asserts that in an economy with a finite dimensional space of goods and services there always exist equilibrium prices for which the supply and demand of the economy coincide. There are several mathematical models that present proofs of this result. In this talk, we shall indicate how one can prove such a theorem using functional analytic methods and then proceed to build a similar model for an economy with an infinite number of goods and agents. (These infinite dimensional models can be thought of as limits of the finite dimensional ones.) The talk will present several powerful functional analytic tools that are employed in the theory of modern Equilibrium Theory.

(8) **John T. Anderson**, College of the Holy Cross, Worcester, MA 01610,
E-mail: anderson@math.holycross.edu BOUNDARY UNIQUENESS THEOREMS FOR NORMAL FUNCTIONS OF SEVERAL VARIABLES

ABSTRACT: A function f meromorphic on a domain Ω in \mathbf{C}^n is said to be normal on Ω if f induces a bounded map from the Kobayashi metric on Ω to the spherical metric on \hat{C} . This definition, given by Cima and Krantz, generalizes the one-variable concept of a normal function due to Lehto and Virtanen. We prove a generalization of the Pincuk boundary uniqueness theorem to the class of normal functions: if f is normal on Ω and has nontangential limit zero on a subset of a totally real submanifold M of the boundary of Ω of positive measure (relative to M), then f vanishes identically in Ω . (This is joint work with J. Cima).

(9) **Jesús Araujo**, University of Cantabria, Santander, Spain, E-mail: araujoj@ccaix3.unican.es BISEP-ARATING MAPS, AUTOMATIC CONTINUITY, AND BANACH-STONE MAPS

ABSTRACT: It is shown that the existence of a biseparating map T between some spaces of vector-valued continuous functions $A(X, E)$ and $A(Y, F)$ implies that the realcompactifications of X and Y are homeomorphic. Also, if E is finite-dimensional, X and Y are realcompact, and $C(X, E)$ and $C(Y, F)$ are endowed with the compact-open topology, then every biseparating linear map $T : C(X, E) \rightarrow C(Y, F)$ is a Banach-Stone map, which implies in particular that under these hypothesis every biseparating linear map is a linear isomorphism. These results are used to prove that if for open subsets Ω and Ω' of \mathbb{R}^1 and \mathbb{R}^n , respectively, $T : C^n(\Omega) \rightarrow C^m(\Omega')$ is a linear biseparating map, then $p = q$, $n = m$, and there exist a diffeomorphism h of class C^m from Ω' onto Ω , and a map $a \in C^m(\Omega)$ such that for every $y \in \Omega$ and every $f \in C^n(\Omega)$, $(Tf)(y) = a(y)f(h(y))$.

(10) **Jonathan Arazy**, University of Haifa, Haifa, 31905 Israel, E-mail: jarazy@mathcs11.haifa.ac.il INVARIANT INNER PRODUCTS BY BOUNDARY INTEGRATION

ABSTRACT: Let D be a Cartan domain of tube type in \mathbf{C}^d , and let G be the group of all biholomorphic automorphisms of D . We study concrete descriptions (by means of Besov-type integral formulas) of the analytic continuation of the G -invariant weighted Bergman spaces over D . Particular attention is paid to the description of the G -invariant inner products on the spaces of analytic functions on D associated with the discrete Wallach points. In this case the integration is taken over the appropriate G -orbit in the boundary of D . (Joint work with H. Upmeyer).

(11) **Hugo Arizmendi***, National Autonomous University of Mexico, 04510 Mexico D.F., Mexico, E-mail: hugo@servidor.unam.mx, **A. Carrillo** National Autonomous University of Mexico, 04510 Mexico D.F., Mexico, **and L. Palacios**, National Autonomous University of Mexico, 04510 Mexico D.F., Mexico, ON MATRIX TRANSFORMATIONS BETWEEN ALGEBRAS OF ANALYTIC FUNCTIONS

ABSTRACT: Let A denote the space of all complex sequences $\sum_{i=0}^{\infty} a_n z^n$ that converges for all $|z| < 1$, and B the space of all complex sequences $\sum_{i=0}^{\infty} b_n z^n$ for which there exists a complex number λ , $|\lambda| > 1$ such that $\sum_{i=0}^{\infty} b_n \lambda^n$ converges. It is well known that $A^* = B$ and $B^* = A$, where A^* is the *dual* of A . In this talk we prove that B , provided with the *normal* topology given by A , turns out to be a topological algebra. Also we characterize all the matrix transformations from A into B and from B into A as the linear continuous transformations with respect to this normal topology of B . Finally, we characterize the respective multiplicative transformations.

(12) **Richard Aron**, Kent State University, Kent, OH 44242, USA, E-mail: aron@mcs.kent.edu ZERO SUBSPACES OF COMPLEX POLYNOMIALS

ABSTRACT: A. Plichko and A. Zagorodnyuk have proved that for any positive integers n and d , there is a positive integer m such that every d -homogeneous polynomial $P : \mathbb{C}^m \rightarrow \mathbb{C}$ has an n -dimensional subspace contained in its zero set. We outline their procedure, and discuss the problem of finding a good bound on m as a function of n and d .

(13) **Parthena Avramidou***, University of Wyoming, Laramie, WY 82071-3036, E-mail: lina@uwyo.edu and **F. Jafari**, University of Wyoming, Laramie, WY 82071-3036, E-mail: fjafari@uwyo.edu NORM OF COMPOSITION OPERATORS

ABSTRACT: Recently, Cowen and MacCluer posed the following interesting question: When can one recover the norm of a composition operator on the Hardy space H^2 of the unit disk solely from the action of this operator on the reproducing kernel functions? Recent work of Appel, Bourdon and Thrall shows that, in general, the norm of composition operators is *not* obtained by considering the reproducing kernel functions. In this talk, we will present results characterizing composition operators, in terms of their norm, relative to their action on the reproducing kernel functions.

(14) **Sheldon Axler**, San Francisco State University, San Francisco, CA 94132, E-mail: axler@sfsu.edu THE BEREZIN TRANSFORM ON THE TOEPLITZ ALGEBRA

ABSTRACT: The Bergman space is the Hilbert space consisting of the analytic functions on the unit disk that are square integrable. Each bounded analytic function on the unit disk gives rise to a multiplication operator on the Bergman space. This talk focuses on the C^* -algebra generated by the multiplication operators on the Bergman space. We will define the Berezin transform and show why it is a useful tool in the study of this C^* -algebra and its commutator ideal.

(15) **Catalin Badea**, University of Lille I, Lille, France, E-mail: Catalin.Badea@univ-lille1.fr THE STABLE RANK OF SOME BANACH ALGEBRAS

ABSTRACT: There are several notions of stable ranks for topological algebras. The emphasis in my talk will be on topological stable rank tsr and on the more algebraic counterpart, the Bass stable rank Bsr . For the C^* -algebra $C(X)$ of all continuous complex-valued functions on a compact space X , both stable ranks agree and their common value can be expressed in terms of the covering dimension of X .

The aim of the talk is to discuss several other classes of topological algebras for which computation of stable ranks are possible.

(16) **Chafiq Benhida**, University of Lille I, Lille, France, E-mail: Chafiq.Benhida@univ-lille1.fr ON THE SHIFT OPERATOR AND FINITE DIMENSIONAL PERTURBATIONS

ABSTRACT: We give some results about the membership of finite dimensional perturbations of shift operators to certain classes of contractions. Namely $\mathbf{A}_{m,n}$ appearing in the theory of dual algebras. We

also recapture some results of Y. Nakamura in the one dimensional case. The results obtained yield informations about the lattice of invariant subspaces and the reflexivity.

(17) **Alain Bernard**, The Fourier Institute, Grenoble, France, E-mail: Alain.Bernard@ujf-grenoble.fr
 LOCALLY CONSTANT (ON DENSE OPEN SETS) FOURIER TRANSFORMS

ABSTRACT: (common work with G. Muraz) Let $A_0(\mathbb{T})$ be the space of those continuous functions u on the torus which satisfy the two following conditions:

1. u belongs to $A(\mathbb{T})$ (absolutely converging Fourier series),
2. there exists a dense open subset U of \mathbb{T} s.t. $u|_U$ is locally constant.

We prove that the normed space $A_0(\mathbb{T})$ (with the norm of $A(\mathbb{T})$) is ultrabornological (inductive limit of Banach spaces). One can for instance deduce from such a result that there exists u in $A_0(\mathbb{T})$ and v in $C(\mathbb{T})$ with uniformly converging Fourier series s.t. the product $u \cdot v$ is not of uniformly converging Fourier series.

(18) **Swanhild Bernstein**, University of Mining and Technology, D-09596 Freiberg, Germany,
 E-mail:bernstein@mathe.tu-freiberg.de ON THE RIEMANN PROBLEM IN QUATERNIONIC ANALYSIS

ABSTRACT: The classical complex Riemann problem consists in determining an analytical function which fulfills a special condition on the boundary of a domain in the complex plane. We want consider the following higher dimensional problem, which is an analog to the complex Riemann problem. We want to determine in $R^3 \setminus R^2$ monogenic function u , i.e.

$$Du = \sum_{j=1}^3 e_j \frac{\partial}{\partial x_j} u(x) = 0 \text{ in } R^3 \setminus R^2,$$

$$u_+ = H(x)u_- + h(x) \text{ on } R^2, \quad u(x) = \mathcal{O}(|x|^{\frac{1}{2}}) \text{ as } |x| \rightarrow \infty.$$

Using Plemlj-Sokhotzki formulae this problem can be transformed into a singular integral equation on R^2 :

$$\frac{1}{2}(1 + H(x)) + \frac{1}{2}(1 - H(x))Su = h(x),$$

where S denotes the singular Cauchy-transform $(Su)(x) = \frac{1}{2\pi} \int_{R^2} \frac{(x-y)}{|x-y|^3} e_3 u(y) dy$. Because of the non-commutativity of multiplication in the quaternionic algebra a simple translation of classical ideas not possible. We show that the index of the problem is zero if $H_0(x) > 0$ or $H_0(x) < 0$ for all $x \in R^2$.

(19) **Juan P. Bes** Kent State University, Kent, OH 44242, USA, E-mail: jbes@mcs.kent.edu HYPERCYCLIC DIFFERENTIATION OPERATORS

ABSTRACT: A classical theorem due to G. D. Birkhoff states that there exists an entire function whose translates approximate any given entire function, as accurately as desired, over any ball of the complex plane. We show this result may be generalized by replacing the complex plane by an arbitrary Banach space with separable dual, and by considering the complete algebra generated by such dual in place of the space of holomorphic functions over the complex plane. (Joint work with R. Aron).

(20) **Oscar Blasco**, University of Valencia, Burjassot - Valencia, Spain, E-mail: Oscar.Blasco@uv.es
 CONVOLUTION OF VECTOR-VALUED FUNCTIONS BY MEANS OF BILINEAR MAPS AND APPLICATIONS

ABSTRACT: Given a bilinear and bounded map $u : X \times Y \rightarrow Z$ where X, Y, Z are Banach spaces and given two Banach-space valued functions $f(z) = \sum_{n=0}^{\infty} x_n z^n$ and $g(z) = \sum_{n=0}^{\infty} y_n z^n$ where $x_n \in X, y_n \in Y$ we define

$$g *_u f(z) = \sum_{n=0}^{\infty} u(x_n, y_n) z^n.$$

This definition generalizes the classical identity $f \hat{*} g(n) = \hat{f}(n)\hat{g}(n)$ and leads to a generalization of Young's inequality in the setting of Besov spaces from which several applications in different settings can be achieved.

(21) **Alexander Borichev**, University of Bordeaux I, Talence 33405, France,
 E-mail: borichev@math.u-bordeaux.fr INVARIANT SUBSPACES OF GIVEN INDEX IN BANACH SPACES OF ANALYTIC FUNCTIONS

ABSTRACT: Consider the operator M_z of multiplication by z acting (continuously) on a Banach space B of analytic functions on the unit disc D . A (closed) subspace E of B is called (z -) invariant if $zE = M_z E \subset E$. The index of E is the dimension of the quotient space $E/\text{Clos}_B(zE)$.

For a wide class of Banach spaces of analytic functions in the unit disc including all weighted Bergman spaces with radial weights and for weighted ℓ_A^p spaces we construct z -invariant subspaces of index n , $1 \leq n \leq +\infty$.

This extends earlier results by Apostol, Bercovici, Foaş and Percy, and by Hedenmalm, Richter and Seip.

(22) **Eggert Briem**, University of Iceland, Dunhaga 3, 107 Reykjavik, Iceland, E-mail: briem@rhi.hi.is
 FUNCTIONS OPERATING ON SPACES OF CONTINUOUS FUNCTIONS VANISHING AT INFINITY ON LOCALLY COMPACT SPACES

ABSTRACT: A real-valued function h is said to *operate* on a subspace B of $C_{\mathbf{R}}(X)$ if the composite function $h \circ b$ is in B whenever b is in B and the composition is defined (i.e. whenever $b(X)$ is contained in the domain for h). The Stone-Weierstrass Theorem says that if $h(t) = t^2$ operates on B , where B is uniformly closed, contains the constant functions and separates the points of X , then $B = C_{\mathbf{R}}(X)$.

This result was generalized by Y. Katznelson and K. deLeeuw in [2] they replaced $h(t) = t^2$ by any continuous non-affine function defined on an interval I . One can ask whether similar results hold for the case where B does not contain the constant functions, or more generally, where B is a subspace of $C_0(X)$ for some locally compact space X . I will discuss this question in my talk and present results which go further than the results I obtained previously in [1].

[1] E. Briem, *Symbolic calculus for subspaces of $C_0(X)$* , Math. Scand. 76 (1995), 98-104.

[2] K. de Leeuw and Y. Katznelson, *Functions that operate on non-selfadjoint algebras*, J. Analyse Math. 11 (1963), 207-219.

(23) **Svetlana Butler**, Northern Illinois University, DeKalb, IL 60115, USA, E-mail: butler@math.niu.edu
 EXTREMAL QUASI-MEASURES

ABSTRACT: A quasi-measure is a monotone, regular, additive, but not subadditive set function defined on open or closed subsets of a compact Hausdorff space. The set of extreme points in the space of all quasi-measures includes quasi-measures that assume n values (for any natural number n), while in the case of measures, the extreme points are all $\{0, 1\}$ -valued, i.e. pointmasses.

(24) **Peter G. Casazza***, University of Missouri, Columbia, MO 65211, USA, E-mail: pete@casazza.math.missouri.edu and **N. J. Kalton**, University of Missouri, Columbia, MO 65211, USA, E-mail: nigel@math.missouri.edu
 UNIQUENESS OF UNCONDITIONAL BASES IN c_0 -PRODUCTS

ABSTRACT: We present some joint work with N.J. Kalton. In this paper we give counterexamples to a conjecture of Bourgain, Casazza, Lindenstrauss and Tzafriri that if X has a unique unconditional basis (up to permutation) then $c_0(X)$ also has a unique unconditional basis. We also give some positive results including a simpler proof that $c_0(\ell_1)$ has a unique unconditional basis and a proof that $c_0(\ell_{p_n}^{N_n})$ has a unique unconditional basis when $p_n \downarrow 1$, $N_{n+1} \geq 2N_n$ and $(p_n - p_{n+1}) \log N_n$ remains bounded.

(25) **Constantin Dan Cazacu**, University of Missouri, Columbia, MO 65211, USA,
 E-mail: cazacu@picard.math.missouri.edu TWISTED SUMS OF ORLICZ SPACES

ABSTRACT: We describe a procedure to generate quasi-linear maps between Orlicz spaces. This enables us to study the relation between twisted sums of Orlicz spaces and Fenchel-Orlicz spaces. This

is joint work with Nigel J. Kalton.

(26) **Santiago Díaz-Madrigal**, University of Seville, Seville, Spain 41092, E-mail: madrigal@cica.es
COMPACT-TYPE OPERATORS DEFINED ON H^∞

ABSTRACT: The theory of operator ideals on the space H^∞ of bounded analytic functions on the unit disk can be considered relatively new. Indeed, in the well-know monograph of Pełczyński, one can see more questions than results about this topic. This situation changed dramatically with the work of Bourgain at the beginning of 80's. An important part of the increasing number of the results obtained, since that time, can now be looked up in the excellent books of Diestel, Jarchow, and Tonge, and Wojtaszczyk, but they focus their attention mainly on absolutely summing operators. However, general results about operator ideals related to compactness are not so easy to find in the literature, specially bearing in mind that some of them are quite recent. This survey tries to complement, in this aspect, the excellent monographs mentioned above.

(27) **Stephen Dilworth**, University of South Carolina, Columbia, SC 29063, E-mail: dilworth@math.sc.edu
ON THE EXTENSIBILITY OF CERTAIN HOMEOMORPHISMS AND LINEAR ISOMETRIES

ABSTRACT: We prove that if X is a non-empty closed subset of \mathbb{R}^n (or, more generally, of a C^1 n -manifold) that is not totally disconnected then there exists a compact set $K \subset X$ of measure zero and a homeomorphism φ of K onto itself which cannot be extended to a homeomorphism of X . We also show that (in general) the set K cannot be taken to be either connected or countable and that the result would be false (in general) if X were assumed to be totally disconnected and of positive volume. Finally, using the Banach-Stone theorem, we deduce an extension result for isometries that are defined on certain subspaces of $C(\Delta)$.

(28) **Ian Doust**, University of New South Wales, Sydney, Australia 2052, E-mail: i.doust@unsw.edu.au
FUNCTIONS OF BOUNDED VARIATION IN OPERATOR THEORY

ABSTRACT: The link between structure theorems for classes of operators (like the spectral theorem) and functional calculus properties of operators has long been known. At least on reflexive spaces, having a functional calculus for the continuous functions on the spectrum of a Banach space operator T is enough to produce an integral representation for T with respect to a countably additive spectral measure. It doesn't particularly complicate matters whether the spectrum is real or not. The situation for operators with slightly less well-behaved integral representations (for example those with conditionally convergent spectral expansions) seems to be different in this respect. The appropriate algebra for operators with real spectrum is the algebra of absolutely continuous functions. In this talk we shall discuss the interplay between function theory and operator theory in the on-going search for a suitable analogue for functions defined on a compact subset of the plane.

(29) **Patrick N. Dowling**, Miami University, Ohio, USA, E-mail: dowlinpn@muohio.edu THE FIXED POINT PROPERTY FOR SUBSETS OF $L_1[0, 1]$

ABSTRACT: We prove that if K is a closed bounded and convex subset of $L_1[0, 1]$ which is not weakly compact, then there is a function f in $L_1[0, 1]$ so that the closed convex hull of the union of K and f contains a closed convex subset failing the fixed point property for nonexpansive mappings. This can be considered as a local version of the fact that non-reflexive subspaces of $L_1[0, 1]$ fail the fixed point property.

(30) **John Duncan**, University of Arkansas, Fayetteville, Arkansas 72701, USA,
E-mail: jduncan@comp.uark.edu EXTREMAL ALGEBRAS FOR HERMITIANS

ABSTRACT: There is a unique monogenic unital Banach algebra A with generator h which is extremal with respect to the condition that the numerical range of h is $[-1, 1]$. The dual space of A consists of all entire functions ϕ with

$$|\phi(z)| \leq M e^{|Re z|} \quad (z \in \mathbb{C}).$$

Crabb and McGregor have uncovered many remarkable properties of A via delicate classical arguments for entire functions. We shall survey some of their results. The corresponding problem for two (non-commuting) Hermitian generators h, k leads to a rather intractable extremal algebra. The case when h, k are idempotents or involutions (that is, $h^2 = k^2 = 1$) is much more tractable and we discuss some recent work on this case.

(31) **Hany M. El-Hosseiny**, Cairo University, Guiza, Egypt, E-mail: hosseiny@FRCU.EUN.EG
 LOCALIZATION OF HARDY SPACES AND BOUNDARY LIMITS OF HARMONIC FUNCTIONS

ABSTRACT: We concern ourselves with the existence of boundary limits at a point $x \in \mathbb{R}^N$ for a distribution belonging locally to the Hardy class H^1 . We use inequalities, proved by L. Chevalier, for maximal functions of distributions on a Euclidean ball to define and study a variant of H^1 localized near a point.

(32) **Joel F. Feinstein**, University of Nottingham, Nottingham NG7 2RD, England,
 E-mail: jff@maths.nott.ac.uk REGULARITY CONDITIONS AND IDEAL SPACES OF BANACH ALGEBRAS

ABSTRACT: We shall discuss some joint work of Feinstein and Somerset concerning a certain topology on the set of all closed ideals in a unital Banach algebra. The topology we shall discuss is the one introduced by Somerset in [1], τ_r . This topology generalizes the usual topologies commonly encountered on collections of closed ideals. The topology is always compact, but not always Hausdorff. Somerset showed that τ_r is Hausdorff for finite-dimensional algebras, TAF-algebras, and Banach algebras with spectral synthesis. In [2] it was shown that τ_r is Hausdorff for $C^1[0, 1]$, but that if A is a uniform algebra then τ_r is Hausdorff if and only if A has spectral synthesis. However, it is possible for a uniform algebra A to be strongly regular and for every maximal ideal of A to have a bounded approximate identity without A having spectral synthesis.

We shall discuss some of these results together with some related examples and questions. We shall also discuss results for some other classes of Banach algebras.

[1] Somerset, D.W.B., Ideal spaces of Banach algebras, *Proc. London Math. Soc.*, to appear.

[2] Feinstein, J.F. and Somerset, D.W.B., A note on ideal spaces of Banach Algebras, *Bull. London Math. Soc.*, to appear.

(33) **Eva Gallardo Gutierrez**, University of Cadiz, 11.510 Cadiz, Spain, E-mail: gallardo@galeon.uca.es
 HYPERCYCLIC COMPOSITION OPERATORS ON SPACES OF CONTINUOUS FUNCTIONS

ABSTRACT: A bounded operator in a separable Hilbert space \mathcal{H} is said to be hypercyclic if there is a vector $x \in \mathcal{H}$ such that $\{T^n x\}$ is dense in \mathcal{H} . Hypercyclicity scalar multiples of composition operators on the Dirichlet space is studied. It will also be shown these operators are hypercyclic in certain natural Hilbert spaces of continuous functions on the unit disk.

(34) **Theodore W. Gamelin**, University of California Los Angeles, Los Angeles, CA 90095, E-mail: twg@math.ucla.edu
 CONJUGATION THEOREMS AND COMPOSITION OPERATORS

ABSTRACT: Some conjugation theorems from iteration theory will be discussed. Proofs of the theorems of Boettcher and of Koenigs based on composition operators will be given.

(35) **Fereidoun Ghahramani**, University of Manitoba, Winnipeg, Manitoba, Canada, R3T 2N2, E-mail: fereidou@cc.UManitoba.CA
 DERIVATIONS OF $L^1(G)$.

ABSTRACT: In this talk I will report on progress on the problem of derivations of $L^1(G)$, of a locally compact group G .

(36) **Stanisław Goldstein**, Łódź University, 90-238 Łódź, Poland, E-mail: goldstei@math.uni.lodz.pl
 APPLICATIONS OF NONCOMMUTATIVE L^p SPACES

ABSTRACT: We construct noncommutative L^p -spaces for an interesting class of C^* -algebras. Let (A, φ) be a “noncommutative probability space” consisting of a C^* -algebra A and a faithful state φ on

A. Under appropriate assumptions on A and φ our spaces $L^p(A, \varphi)$ turn out to be isomorphic, as Banach spaces, to the Haagerup spaces $L^p_p(M)$ where $M = \pi^{\varphi(A)''}$ is the von Neumann algebra engendered by the GNS-representation π^φ associated with the state φ . We show how the interpolation theory of Haagerup L^p -spaces helps in the analysis and construction of quantum dynamical semigroups. The results have been obtained in collaboration with J. Martin Lindsay and Phan Viet Thu.

(37) **Manuel Gonzalez***, University of Cantabria, 39071 Santander, Spain,

E-mail: gonzalem@ccaix3.unican.es and **Antonio Martínez-Abejón**, University of Oviedo, 33071 Oviedo, Spain REPRESENTATIONS OF ULTRAPOWERS OF $L_1[0, 1]$

ABSTRACT: Dacunha-Castelle and Krivine proved that each ultrapower $L_1(\mu)_U$ of a Banach space $L_1(\mu)$ admits a representation

$$L_1(\mu)_U = L_1(\mu_U) \oplus_1 L_1(\nu_U).$$

In the case that μ is a finite measure, we characterize the elements of $[f_i] \in L_1(\mu)_U$ that belong to $L_1(\mu_U)$ or to $L_1(\nu_U)$. Moreover, for some ultrafilters V on the positive integers \mathbb{N} , whose existence is proved using the Continuum Hypothesis, we show that $[f_i] \in L_1(\mu_V)$ if and only if $\{f_i\}$ is weakly convergent following the ultrafilter V , and $[f_i] \in L_1(\nu_V)$ if and only if $[f_i] = [g_i]$, where $\{g_i\}$ consists of pairwise disjoint functions. As a consequence, we obtain an ultrapower version of the subsequence splitting principle for bounded sequences in $L_1(\mu)$. It is remarkable that some of these results fail if, instead of V , we use an ultrafilter on \mathbb{N} which is not a p-point.

For an arbitrary Banach space X , we introduce a subspace X_U^w of the ultrapower X_U that allows us to characterize tauberian operators and weakly compact operators $T : X \rightarrow Y$ in terms of ultrapowers. We study in detail the case $X = L_1(\mu)$ and $U = V$, in which X_U^w coincides with $L_1(\mu_V)$.

(38) **Raquel Gonzalo**, University of Madrid (UCM), Madrid 28040, Spain, E-mail: raquel26@eucmax.sim.ucm.es HIGH ORDER OF SMOOTHNESS IN SYMMETRIC SPACES

ABSTRACT: In this talk we are concerned with high order of smoothness in Banach spaces. By this, we mean the existence of k -times Frechet differentiable equivalent norms (away from zero) and more generally bump functions (real valued functions with bounded support). Our main result states that for spaces with a symmetric basis smoothness has great implications in their structure considered as Banach lattices. More precisely, if a space X with symmetric basis admit a bump which is k -times uniformly Frechet differentiable, then such space admits an upper k -estimate, except in the case of X being isomorphic to ℓ_p where p is an even integer. Note that if p is even integer the space admits a C^∞ -smooth bump. Our proof is based in an argument of symmetrization of functions and some considerations about symmetric polynomials. An analogous result holds for spaces with a subsymmetric basis, and this approach lets to prove that if a space admits a certain degree of differentiability then its "spreading models" (particular class of spaces with subsymmetric basis) share the same degree of smoothness. Some consequences of this fact are given. All of these results are presented in the context of superreflexive spaces, which is equivalent to require *uniform* differentiability, since otherwise they are not true in general.

(39) **Pamela Gorkin**, Bucknell University, Lewisburg, PA 17837, USA, E-mail: pgorkin@bucknell.edu CLOSED IDEALS IN FUNCTION ALGEBRAS

ABSTRACT: In this talk, we will present a survey of results about closed ideals of functions in certain uniform algebras.

(40) **Edmond E. Granirer**, University of British Columbia, Vancouver, BC Canada V6T 1Y4, E-mail: granirer@math.ubc.ca SOME FUNCTIONAL ANALYTIC PROPERTIES OF QUOTIENTS OF THE FOURIER ALGEBRA AS REFLECTED BY SOME SUBSETS OF THE REAL LINE

ABSTRACT: Let E be a closed subset of the real line. Properties such as Arens Regularity, Amenability and Local Non Ergodicity of algebras related to $A(E)$ will be discussed.

(41) **Daniel Grubb**, Northern Illinois University, DeKalb, IL 60115, USA, E-mail: grubb@math.niu.edu
 QUASI-MEASURES AND ALGEBRAIC TOPOLOGY

ABSTRACT: A quasi-measure is a monotone, regular, positive set function defined on the open or closed subsets of a compact Hausdorff space that is additive on disjoint sets. They correspond to functionals on $C(X)$ that are linear on each closed, singly generated subalgebra.

Remarkably, the algebraic topology of the underlying space X has a bearing on what types of quasi-measures may be constructed. This talk will give a number of examples of quasi-measures that are not measures and outline how algebraic topology enters into this subject.

(42) **Leonid G. Hanin**, Idaho State University, Pocatello, ID 83209-8085, USA, E-mail: hanin@isu.edu
 AN EXTENDED KANTOROVICH NORM AND ITS APPLICATIONS

ABSTRACT: The Kantorovich norm of a measure with zero mass arises as the minimal cost in the classical Monge-Kantorovich mass transfer problem and has the following important properties:

1. in contrast to the total variation, it bears a strong relation to the geometry of the underlying metric space;
2. it metrizes weak* convergence of probability measures;
3. for compact metric spaces, the set of Borel measures that are uniformly bounded in total variation is compact in the Kantorovich norm;
4. the conjugate to the space of Borel measures supplied with the Kantorovich norm is isomorphic to the Lipschitz space modulo the subspace of constants.

We extend the Kantorovich norm to the space of *all* measures (not necessarily having zero mass) and study its properties. The main result is the duality theorem which establishes an isometric isomorphism between the space of all measures on a separable metric space K with the extended Kantorovich norm and the space of Lipschitz functions on K . Numerous applications of this result are discussed.

(43) **Osamu Hatori**, Niigata University, Niigata City, Japan, E-mail: hatori@scux.sc.niigata-u.ac.jp
 ALGEBRAS OF CERTAIN FOURIER MULTIPLIERS

ABSTRACT: Let $C_0M^p(\mathbb{R}^n)$, for $1 < p < \infty$ be the algebra of L^p -multipliers on \mathbb{R}^n which Fourier transforms are continuous and vanish at infinity. We show that the greatest regular subalgebra and the Apostol algebra of $C_0M^p(\mathbb{R}^n)$ coincide and they are not ideals of $C_0M^p(\mathbb{R}^n)$.

(44) **William Hornor**, University of Southern Mississippi, Hattiesburg, MS 39406-5045, USA, E-mail: william_hornor@bull.cc.usm.edu and **James E. Jamison***, University of Memphis, Memphis, TN 38152, USA, E-mail: JAMISONJ@hermes.msci.memphis.edu ISOMETRIES OF THE ANALYTIC BESOV SPACES

ABSTRACT: Let $B_p(\delta)$, $1 \leq p < \infty$, $p \neq 2$ denote the analytic Besov spaces on the disk δ . We give a description of the isometries of $B_p(\delta)$ when the (equivalent) norm is given by:

$$\|f\| = \sum_{k=0}^{n-1} |f^{(k)}(0)| + \|f^{(n)}\|_{A^{p, np-2}}$$

where $\|\cdot\|_{A^{p, np-2}}$ denotes the Bergman space norm. Isometries of related spaces will also be discussed.

(45) **Alexander J. Izzo**, Bowling Green State University, Bowling Green, OH 43403, USA, E-mail: aizzo@bgnnet.bgsu.edu USING SEVERAL COMPLEX VARIABLES TO STUDY ALGEBRAS OF FUNCTIONS OF ONE COMPLEX VARIABLE

ABSTRACT: A theorem of Sheldon Axler and Allen Shields asserts that if f is a bounded function that is harmonic but nonholomorphic on the open unit disc \mathbb{D} , then the norm-closed algebra generated by $H^\infty(\mathbb{D})$ and f contains $C(\overline{\mathbb{D}})$. Extensions of this result will be presented.

(46) **Hans Jarchow**, University of Zurich, CH 8057 Zürich, Switzerland, E-mail: jarchow@math.unizh.ch
ISOMETRIC EMBEDDINGS OF SUBSPACES OF L_p INTO ℓ_p

ABSTRACT: (joint work with F.Delbaen and A.Pelczyński) The talk presents the solution of the problem of when e.g. finite-dimensional subspaces of L_p embeds isometrically into ℓ_p and discusses a few related topics.

(47) **Krzysztof Jarosz**, Southern Illinois University, Edwardsville, IL 62026, E-mail: kjarosz@siue.edu
LINEAR MAPS DETERMINING THE NORM TOPOLOGY

ABSTRACT: Let A be a Banach space and let T be a linear map on A . In the most automatic continuity problems we ask for the algebraic conditions on T and A that would force the continuity of T . Here we would like to reverse the problem; we assume that T is continuous and would like to know if that assumption uniquely determine the complete norm topology on A . Certainly not all maps have this property, for example if T is equal to the identity map on an infinite dimensional complemented subspace of A , we can freely change the norm on that subspace without upsetting the continuity of T . We will investigate mostly the multiplication operators on commutative semisimple Banach algebras; we also prove that any separable Banach spaces has a continuous map that determines its complete norm topology.

(48) **Nigel J. Kalton**, University of Missouri, Columbia, MO 65211, USA, E-mail: nigel@math.missouri.edu
LEGENDRE POLYNOMIALS IN L_p -SPACES

ABSTRACT: (joint work with Lior Tzafriri) We discuss the behavior of Legendre and ultraspherical polynomials in L_p -spaces for $p > 2$.

(49) **Steve Krantz**, Washington University, St. Louis, MO 63130-4899, E-mail: sk@math.wustl.edu
RECENT RESULTS ON THE $\bar{\partial}$ -NEUMANN PROBLEM

ABSTRACT: We describe some joint work with Luigi Fontana and Marco Peloso about the $\bar{\partial}$ -Neumann problem in the Sobolev topology (as opposed to the more traditional formulation in the L^2 topology). The new formulation gives rise to a new boundary value problem, with new boundary terms. Existence and regularity will be discussed. Possible applications will be indicated.

(50) **Denka N. Kutzarova***, Bulgarian Academy of Sciences, 1113 Sofia, Bulgaria,
E-mail: DENKA@BGEMN.acad.bg and **T. Zachariades**, University of Athens, 15784 Athens, Greece,
UNIFORMLY NON-SQUARE OVER BLOCKS BANACH SPACES AND RELATED PROPERTIES

ABSTRACT: We introduce a class of spaces which are uniformly non-square over blocks for Banach spaces with a Schauder finite dimensional decompositions. We prove that the James tree space has the above property and we give a sufficient condition for a space with this property to be orthogonally convex.

(51) **Denny H. Leung**, National University of Singapore, Singapore 119260, E-mail: matlhh@nus.edu.sg
MORE BANACH SUBLATTICES OF THE BANACH ENVELOPE OF WEAK L^1

ABSTRACT: The space weak L^1 consists of all Lebesgue measurable functions f on $[0, 1]$ such that the quasinorm

$$q(f) = \sup_{t>0} t\lambda\{|f| > t\} < \infty,$$

where λ denotes Lebesgue measure. Let ρ be the gauge functional of the convex hull of the unit ball $\{f : q(f) \leq 1\}$, and let N be the null space of ρ . The Banach envelope of weak L^1 , which we denote by W , is the completion of the normed space $(\text{Weak } L^1/N, \rho)$. Peck and Talagrand (*Israel J. Math*, 1987) showed, among other things, that every separable Banach lattice with an order continuous norm is isometrically lattice isomorphic to a sublattice of W . Recently, Lotz and Peck (*Proc. AMS*, 1998) extended the result to the class of all separable Banach lattices. More generally, they showed that if E is a separable Banach lattice, and E' has a weak order unit, then E' is isometrically lattice isomorphic to a sublattice of W . In this talk, we identify, in some sense, the largest sublattice of W of the type $\oplus_\infty L^1$.

As a consequence, we show that if E is a separable Banach lattice and E' has a weak order unit, then E' is isometrically lattice isomorphic to a sublattice of W . It is also shown that the dual of every separable Banach lattice is order isometric to a closed subspace of W .

(52) **Mikael Lindström**, Åbo Akademi University, FIN-20500 Åbo, Finland, E-mail: mlindstr@ra.abo.fi
SETS OF INTERPOLATION FOR WEIGHTED BANACH SPACES OF HOLOMORPHIC FUNCTIONS

ABSTRACT: Let $H_v^\infty(\mathbb{D})$ be the Banach space of analytic functions f on the unit disk \mathbb{D} with $v(z)|f(z)|$ bounded, where $v : \mathbb{D} \rightarrow \mathbb{R}_+$ is a radial continuous strictly positive function. In 1993 K. Seip gave a complete characterization of sets of interpolation for the weight $v(z) = (1 - |z|^2)^p$, $p > 0$, in terms of a special type of density. In this talk we shall discuss necessary and sufficient conditions for a set to be a set of interpolation with respect to more general weights v on \mathbb{D} , i.e. radial weights v satisfying the condition $v(1 - 2t) \leq Cv(1 - t)$ for all $t \in (0, \frac{1}{2}]$ and some constant C . The talk is based on joint work with Paweł Domański.

(53) **Manuel Maestre**, University of Valencia, Burjassot - Valencia, Spain, E-mail: Manuel.Maestre@uv.es
BIDUALITY OF WEIGHTED SPACES OF HOLOMORPHIC FUNCTIONS

ABSTRACT: In this talk we deal with some problems related to the weighted spaces of holomorphic functions $\mathcal{H}V(U)$ and $\mathcal{H}V_0(U)$, where U is a balanced open subset of a complex Banach space X and V is a countable family of continuous weights defined on U . We discuss when the weighted polynomials are dense in $\mathcal{H}V_0(U)$. Also we discuss "reasonable" restrictions on the weights to get that the sequence of weighted m -homogeneous polynomials are a Schauder decomposition of the above spaces. Finally, for the case $X = \mathbb{C}^n$, we study conditions to ensure that the bidual of $\mathcal{H}V_0(U)$ is $\mathcal{H}V(U)$; and, in the general setting, we give sufficient conditions to obtain that the space $\mathcal{H}V(U)$ is a reflexive space.

(54) **Shamil Makhmutov**, Ufa State Aviation Technical University, Ufa, 450000, Russia, E-mail: makhm@max.ugatu.ac.ru, COMPOSITION OPERATORS ON THE BLOCH SPACE

ABSTRACT: Let φ be an analytic map of the unit disc \mathbb{D} into itself and let $\varphi^*(z) = |\varphi'(z)|(1 - |\varphi(z)|^2)^{-1}$ be the hyperbolic derivative.

We will give the hyperbolic version of the first fundamental theorem :

$$T_*(r, \varphi) = m_*(r, \varphi, a) - N(r, \varphi, a), \quad a \in D,$$

where $T_*(r, \varphi)$ is the hyperbolic characteristic function involving $\varphi^*(z)$ and $m_*(r, \varphi, a)$ is the hyperbolic proximity function. We show that analytic self-maps of the unit disc \mathbb{D} with given behavior of $T_*(r, \varphi)$ induce compact composition operators on the Bloch space \mathcal{B} .

(55) **John McCarthy**, Washington University, St. Louis, MO 63130-4899, E-mail: mccarthy@math.wustl.edu
COMPLETE NEVANLINA-PICK KERNELS

ABSTRACT: Given points $\lambda_1, \dots, \lambda_N$ and z_1, \dots, z_N in the unit disk D , the classical Nevanlinna-Pick theorem gives a necessary and sufficient condition for the existence of an analytic function $\phi : D \rightarrow D$, with $\phi(\lambda_i) = z_i$, $i = 1, \dots, N$. Similar theorems are true in other spaces of functions. All function spaces in which a matrix Nevanlinna-Pick theorem holds embed in a universal such space. We shall discuss this, and also Nevanlinna-Pick interpolation on the bidisk.

(56) **Len Miller**, Mississippi State University, MS 39762, USA, E-mail: miller@math.msstate.edu and **Vivien Miller***, Mississippi State University, MS 39762, USA, E-mail: vivien@Euler.Math.MsState.Edu
FACTS ABOUT THE BERGMAN SPACE CESARO OPERATOR

ABSTRACT: Define the Cesàro operator on the space of analytic functions on the unit disk by

$$Cf(z) = \sum_{n=0}^{\infty} \left(\frac{1}{n+1} \sum_{k=0}^n a_k \right) z^n = \frac{1}{z} \int_0^z \frac{f(w)}{1-w} dw$$

for $f(z) = \sum_{n=0}^{\infty} a_n z^n$. If $1 \leq p < \infty$ and m is normalized area measure on D , let $L_a^p(D)$ denote the Bergman space $L_a^p(D) = \{f \in L^p(D, m) : f \text{ is analytic in } D\}$, and let $C_p = C|_{L_a^p}$.

We show that for $p > 2$, the open disk $B(p/4, p/4)$ is contained in $\sigma(C_p) \setminus \sigma_{ap}(C_p)$. Moreover, if $\lambda \in B(p/4, p/4)$, then we identify the range of $\lambda I - C_p$ as a space of codimension one and exhibit a left inverse. As a corollary, we obtain that when $p \geq 4$, the operator C_p has Bishop's property (β).

(57) **Takeshi Miura**, Niigata University, Niigata, Japan, E-mail: miura@scux.sc.niigata-u.ac.jp
ON BANACH FUNCTION ALGEBRAS IN WHICH EVERY ELEMENT IS SQUARE OF ANOTHER

ABSTRACT: Let $C(X)$ be the algebra of all complex-valued continuous functions on a compact Hausdorff space X . We consider the condition

- (1) For every $f \in C(X)$ there exists a $g \in C(X)$ such that $f = g^2$.

We show a characterization of locally connected X for which $C(X)$ satisfies (1). But the condition is neither necessary nor sufficient for (1) unless X is locally connected. We consider following condition weaker than (1):

- (2) For each $\varepsilon > 0$ and each $f \in C(X)$ there exist $g, h \in C(X)$ such that $f = gh, \|g - h\|_\infty < \varepsilon$

We consider the relation between (1) and (2).

(58) **Jerzy Mogilski**, University of Texas at Brownsville, Brownsville, Texas 78520, USA, E-mail: jkm@UTB1.UTB.EDU
FREE TOPOLOGICAL VECTOR SPACES AND THEIR APPLICATIONS IN INFINITE-DIMENSIONAL TOPOLOGY

ABSTRACT: If X is a set, then $L(X)$ denotes the free vector space spanned by X . If X is a topological space, then there exists a vector space topology $\tau(X)$ on $L(X)$ such that:

1. X is a topological subspace of $(L(X), \tau(X))$, and
2. every continuous map f of X into a topological vector space E extends to a continuous linear operator of $(L(X), \tau(X))$ in E .

The topological vector space $(L(X), \tau(X))$ is called the *free topological vector space* over X . We will discuss applications of free topological vector spaces to the following two problems:

Problem 1 (West's List - Problem L.S.19 (994) p. 569) Is every equiconnected space a retract of a convex subset of an F-space (of a linear metric space)?

Problem 2 Identify and characterize compact metric spaces X such that $L(X)$ does not have the absolute extension property for some metric linear topology on $L(X)$.

(59) **Alfonso Montes-Rodriguez**, University of Sevilla, Sevilla 41080, Spain, E-mail: amontes@cica.es
HYPERCYCLIC AND SUPERCYCLIC SUBSPACES

ABSTRACT: Let T be a bounded operator on a Banach space \mathcal{B} . The operator T is said to be hypercyclic if there is a vector x such that $\{T^n x\}$. In such a case the vector x is said to be a hypercyclic vector for T . We will discuss a spectral characterization of such a hypercyclic operator has an infinite dimensional closed subspace, consisting except for zero, of hypercyclic vectors. The corresponding problem for supercyclic operators also be treated.

(60) **Antonio Moreno-Galindo**, University of Granada, 18071 Granada, Spain,
E-mail: agalindo@goliat.ugr.es ON REAL PRIME JB^* -TRIPLES

ABSTRACT: We give a characterization of real prime JB^* -triples. We show, that given a real prime JB^* -triple A , then the inequality $\|Q_{a,b}\| \geq \frac{1}{12}\|a\|\|b\|$ holds for every a, b in A . Here $Q_{a,b} : A \rightarrow A$ is the mapping defined by $Q_{a,b}(x) = \{axb\}$ for $x \in A$. (Joint work with C-H. Chu and A. Rodriguez-Palacios).

(61) **Takahiko Nakazi**, Hokkaido University, Sapporo, 060 Japan, E-mail: nakazi@math.sci.hokudai.ac.jp
SOME SPECIAL BOUNDED HOMOMORPHISMS OF A UNIFORM ALGEBRA

ABSTRACT: Let A be a uniform algebra on X and $C(X)$ the set of all continuous functions on X . Let H be a Hilbert space and $L(H)$ the set of all bounded linear operators on H . Suppose Φ is a unital bounded homomorphism from A to $L(H)$. We are interested in the following problem : When does the extension $\tilde{\Phi}$ of Φ exist where $\tilde{\Phi}$ is a unital bounded homomorphism from $C(X)$ to $L(K)$ and K is a Hilbert space with $K \supseteq H$? This problem is equivalent to the following : When Φ is completely bounded ?

In this lecture, we will give a new example of a hypo-Dirichlet algebra such that $\|\tilde{\Phi}\| = \|\Phi\|$ if $\|\Phi\| = \left(\sup_{\|f\|_\infty \leq 1} \sup_{y \in H, \|y\|=1} \|\phi(f)y\| \right) \leq 1$. When Φ is not necessary contractive, there may not exist $\tilde{\Phi}$ even for the disc algebra by G. Pisier.. When $w(\Phi) = \left(\sup_{\|f\|_\infty \leq 1} \sup_{y \in H, \|y\|=1} |\langle \Phi(f)y, y \rangle| \right) \leq 1$, we show that there exists $\tilde{\Phi}$ if A is a Dirichlet algebra or $\dim A / \ker \Phi \leq 2$. For the disc algebra, this is a result of C. A. Berger.

(62) Michael M Neumann, Mississippi State University, MS 39762, USA,

E-mail: neumann@Euler.Math.MsState.Edu FUNCTIONAL MODELS FOR OPERATORS ON BANACH SPACES

ABSTRACT: We shall discuss some of the recent developments in the local spectral theory of bounded linear operators on Banach spaces. Particular emphasis will be on restrictions and quotients of decomposable operators and their models in terms of multiplication operators on certain Sobolev-type spaces. The theory will be exemplified by several canonical classes of convolution and multiplication operators on function spaces.

(63) Vijay Damodar Pathak, M.S. University of Baroda, Baroda - 390 001, India, ISOMETRIES

AND SMALL BOUND ISOMORPHISMS OF $C_0^{(n)}(X)$

ABSTRACT: The representation of surjective linear isometries between complex normed spaces $C_0^{(n)}(X)$ and $C_0^{(n)}(Y)$ where X and Y are locally compact subsets of \mathbb{R} without isolated points, is given in [1] and of surjective linear isometries on $C^{(n)}[0, 1]$, the Banach algebra of complex valued n times continuously differentiable functions on $[0, 1]$ with norm

$$\|f\| = \sup_{x \in [0,1]} \left(\sum_{r=0}^n \frac{|f^{(r)}(x)|}{r!} \right), \quad \text{for } f \in C^{(n)}[0, 1],$$

is given in [4]. These results have been extended for surjective linear isometries between $C_0^{(n)}(X)$ and $C_0^{(n)}(Y)$ by Wang in [5]. Relevance of this result in the context of the technical scheme described in [3], for verifying whether any isometry between function spaces on X, Y is given by a homeomorphism between X and Y , will be discussed in the first part of the lecture. Further, we will discuss the possibility of checking whether existence of a small bound isomorphism between $C_0^{(n)}(X)$ and $C_0^{(n)}(Y)$ implies that X and Y are homeomorphic. Note that such a result for $n = 1$ has been proved in [2].

[1] M. Cambern and V. D. Pathak, Isometries of spaces of differentiable functions, Math. Japonica 26 (1981), 253-260.

[2] M. Cambern and V. D. Pathak, Isomorphisms of spaces of differentiable functions, Rev. Roumaine Math. Pure et appl. XXII, (7), 1982, 737-743.

[3] K. Jarosz and V. D. Pathak, Isometries between function spaces, Trans. AMS, 305 (1988), 193-206.

[4] V. D. Pathak, Isometries of $C^{(n)}[0, 1]$, Pacific J. Math., 94 (1981) 211-222.

[5] R. Wang, Isometries of $C_0^{(n)}(X)$, Hokkaido Math. J. 25 (1996) 465-519.

(64) Mihaela Poplicher, University of Southern Illinois, Carbondale, IL 62901, USA,

E-mail: mpoplich@math.siu.edu, ON SOME RANGE INCLUSIONS

ABSTRACT: The talk will include conditions that assure the invariance of certain de Brange spaces under some composition operators or adjoints of composition operators.

(65) Beata Randrianantoanina, Miami University, Oxford, OH 45056, USA, E-mail:

randrib@muohio.edu NON-SURJECTIVE ISOMETRIES IN ORLICZ SPACES

ABSTRACT: We characterize the form of non-surjective isometries in Orlicz spaces. The form of surjective isometries of any rearrangement-invariant function space has been determined before. However dropping the assumption of surjectivity invalidates the general method. Nonsurjective isometries in Lorentz spaces have been described by Carothers, Haydon and P.K. Lin in 1993, using geometric techniques. In this paper we use a differential technique.

(66) **Narcisse J. Randrianantoanina**, Miami University, Oxford, OH 45056, USA, E-mail: randrin@muohio.edu STRONG REGULARITY FOR KÖTHE-BOCHNER SPACES

ABSTRACT: Let X be a Banach space and $(\Omega, \Sigma, \lambda)$ be a σ -finite measure space. It is shown that if X is strongly regular and E is a Köthe function space on $(\Omega, \Sigma, \lambda)$ with the Radon-Nikodym property then the Bochner space $E(X)$ is strongly regular. This shows in particular that $L^p(\lambda, X)$ is strongly regular for $1 < p < \infty$.

(67) **Yves Raynaud**, University of Paris VI, 75230 Paris, France, E-mail: yr@ccr.jussieu.fr ON ULTRAPOWERS OF NONCOMMUTATIVE L_1 SPACES

ABSTRACT: It is well known that the ultrapowers of the (commutative) Bochner spaces $L_p(\Omega, \Sigma, \mu)$, $1 \leq p < \infty$ relative to a given ultrafilter are Bochner spaces $L_p(\widehat{\Omega}, \widehat{\Sigma}, \widehat{\mu})$ relative to the same enlarged measure space $(\widehat{\Omega}, \widehat{\Sigma}, \widehat{\mu})$. For $p = 1, 2$ we explain a non commutative analog of this fact, using the theory of standard forms of Von Neumann algebras.

(68) **Richard Rochberg**, Washington University, St. Louis, MO 63130-4899, E-mail: rr@sulu.wustl.edu ESTIMATES OF BERGMAN KERNEL FUNCTIONS

ABSTRACT: For a domain R in \mathbb{C} and a positive function m on R , the associated Bergman space, H , is the subspace of $L^2(R, m dx dy)$ consisting of holomorphic functions. H contains a distinguished set of elements, the Bergman kernel functions, $\{k_z\}_{z \in R}$ which are characterized by $\langle f, k_z \rangle = f(z)$ for all f in H . These functions play important conceptual and technical roles in the study of the operator theory of H . Sometimes the role is formal but in other cases there is need for analytical estimates for the kernel functions. In classical situations estimates can be obtained using explicit formulas for the kernel functions. However in even minor variations of the classical situations relatively little is known.

We will discuss briefly the role of the kernel functions in the operator theory. We will then discuss some of the analytic estimates that are known for Bergman kernels and some of the techniques used to obtain them.

(69) **Leiba Rodman**, College of William and Mary, Williamsburg, VA 23187 E-mail: lxrodm@math.wm.edu POSITIVE MATRIX FUNCTIONS ON THE BITORUS

ABSTRACT: The talk reports on a joint work with M. Bakonyi, I. M. Spitkovsky, and H. J. Woerdeman.

Let S be a band in \mathbf{Z}^2 bordered by two parallel lines that are of equal distance to the origin. Given a positive definite ℓ^1 sequence of matrices $\{c_j\}_{j \in S}$, we prove that there is a positive definite matrix function f in the Wiener algebra on the bitorus such that the Fourier coefficients $\widehat{f}(k)$ equal c_k for $k \in S$. A parameterization is obtained for the set of all positive extensions f of $\{c_j\}_{j \in S}$. We also prove that among all matrix functions with these properties there exists a distinguished one that maximizes the entropy. A formula is given for this distinguished matrix function. Analogous results are proved also for certain bands in \mathbf{Z}^m , $m > 2$.

(70) **John Ryan**, University of Arkansas, Fayetteville, AR 72701, USA, E-mail: jryan@comp.uark.edu FUNCTION SPACES ASSOCIATED TO DIRAC OPERATORS OVER DISCS, SPHERES AND HYPERBOLAE, AND MÖBIUS TRANSFORMATIONS

ABSTRACT: We shall consider the unit disc in \mathbb{R}^n with $n > 2$. We shall introduce function spaces of solutions to the Dirac equation on the sphere. Using Möbius transformations and a construction due to Ahlfors and Vahlen we are able to simply construct a reproducing Bergman kernel for such spaces and also for function spaces associated to iterates of the Dirac operator. Using various types of

Cayley transformations we are able to reproduce these constructions for function spaces associated to Dirac operators over spheres and hyperbolae. Following ideas of Peetre we also introduce measures on the disc, hyperbola and sphere. These measures remain invariant under Möbius transformations. This leads to an investigation of various operators acting over the appropriate function spaces which are also preserved under Möbius transformations. We establish the invariance of the L^2 non-tangential maximal function in upper half space, and on other conformally equivalent spaces under Möbius transformations, and look at some of the applications to operators of Calderon-Zygmund type.

(71) **Fernando Leon Saavedra**, University of Cadiz, Cadiz, E-11510 Spain, E-mail: fleon@cica.es
 A NOTE ABOUT UNIVERSAL FUNCTIONS IN SEVERAL COMPLEX VARIABLES

ABSTRACT: Given a holomorphic domain D of \mathbb{C}^k and a sequence $\{\varphi_n\}_{n \geq 0}$ of automorphisms of D , a universal function on D with respect this sequence of automorphisms, is a holomorphic function f on D such that $\{f \circ \varphi_n\}_{n \geq 0}$ is dense in the space $\mathcal{O}(D)$ of holomorphic functions on D provided with the topology of uniform convergence on compact subsets of D . We will characterize the sequences of automorphisms in the unit ball of \mathbb{C}^k and the polydisk which support universal functions. The notions of uniform convergence to the boundary and polynomial convexity are central to the discussion.

(72) **Scott Saccone**, Washington University, St. Louis, MO 63130-4899, E-mail: sfs@sulu.wustl.edu
 BANACH SPACES OF UNIFORMLY CONVERGENT FOURIER SERIES

ABSTRACT: We study spaces of continuous functions on the unit circle with uniformly convergent Fourier series and show they possess such Banach space properties as the Pelczyński property and the weak sequential completeness of the dual space. We also prove extensions of theorems of Mooney and Sarason from the Hardy space H^∞ to the space H_V^∞ of bounded analytic functions whose partial Fourier sums are uniformly bounded.

(73) **Elias Saleeby**, University of Arkansas, Fayetteville, Arkansas 72701, USA,
 E-mail: esaleeby@comp.uark.edu SAMPLING AND A CLASS OF $P^t(du)$ SPACES WHOSE POINT EVALUATIONS VARY WITH t

ABSTRACT: We construct measures, u (relatively simple in definition), each having the property that the set of analytic bounded point evaluations for $P^t(du)$ (the closure of the polynomials in $L^t(du)$, $t \geq 1$) varies with t . We then examine questions concerning sampling and zero sets in the context of these spaces. This is a joint work with J. Akeroyd.

(74) **Jean Schmets**, University of Liège, Liège, Belgium B-4000, E-mail: J.Schmets@ulg.ac.be
 ANALYTIC EXTENSION OF JETS

ABSTRACT: The talk is based on material coming from a collaboration with M. Valdivia. The main result is as follows:

Theorem. Let K be a compact subset of \mathbb{R}^n

- Every Whitney jet on K has a $BC^\infty(\mathbb{R}^n)$ -extension which is analytic outside K .
- If there is a continuous linear map from the space $\mathcal{E}(K)$ of the Whitney jets on K into $C^\infty(\mathbb{R}^n)$, then there also is a continuous linear extension map E from $\mathcal{E}(\mathbb{R}^n)$ into $BC^\infty(\mathbb{R}^n)$ such that $E\phi$ is analytic outside K for every element ϕ of $\mathcal{E}(K)$.

Extension to spaces of ultradifferentiable functions will be discussed.

(75) **Alexander P. Schuster**, Washington University, St. Louis, MO 63130, USA,
 E-mail: aschust@sulu.wustl.edu INTERPOLATION BY BLOCH FUNCTIONS

ABSTRACT: A new interpolation problem is defined for the Bloch space and some partial results are obtained.

(76) **Peter Semrl**, University of Maribor, Maribor, SI-2000 Slovenia, E-mail: peter.semrl@uni-mb.si
HOMOMORPHISMS AND DERIVATIONS ON $C(X)$

ABSTRACT: Some new results concerning the structure and the stability of homomorphisms and derivations on $C(X)$ will be presented.

(77) **Stuart Sidney**, University of Connecticut, Storrs, CT 06269-3009,
E-mail: SIDNEY@UCONNVM.UCONN.EDU UNIFORM ALGEBRAS AS SUBSPACES OF $C(X)$

ABSTRACT: A uniform algebra A on a compact Hausdorff space X is in particular a closed subspace of the complex Banach space $C(X)$, and so it makes sense to ask how A lies in $C(X)$ from a Banach space point of view. While there are a great variety of possible versions of this question, we wish to focus on two:

1. If $A \subset C(X)$, can A ever be complemented in $C(X)$ in the sense that $C(X) = A \oplus V$ for some closed subspace V of $C(X)$?
2. If A is antisymmetric and the quotient Banach space $C(X)/A$ is separable, must A itself be separable?

The first problem was studied by I. Glicksberg, but the best-known result is undoubtedly W. Rudin's that the disc algebra is not complemented in $C(T)$ where T is the unit circle in the complex plane. The second problem has a natural motivation in one proof of the non-separability of L^∞/H^∞ . In general, both problems remain open. We shall discuss some of the known results, and make additional remarks about these problems.

(78) **Aristomenis G. Siskakis**, University of Thessaloniki, 54006 Thessaloniki, Greece,
E-mail: siskakis@ccf.auth.gr INTEGRATION OPERATORS ON BERGMAN SPACES

ABSTRACT: Let $L_a^p(w)$ be the Bergman space for the weight w . For g analytic on the unit disc \mathbf{D} we consider the operator

$$T_g(f)(z) = \int_0^z f(\zeta)g'(\zeta) d\zeta.$$

For a large class of weights we show that T_g is bounded on $L_a^p(w)$, $1 \leq p < \infty$ if and only if g is in the Bloch space, and T_g is compact if and only if g is in the little Bloch space. Further for the standard weights $w_\alpha(r) = (1-r)^\alpha$, $-1 < \alpha < \infty$, we show that T_g is in the Schatten p -class of $L_a^2(w_\alpha)$ if and only if g is in the analytic Besov space B_p . (joint work with A. Aleman, to appear in *Indiana Univ. Math. Journal*).

(79) **Robert C. Smith**, Mississippi State University, Mississippi State, MS 39762, USA, E-mail: smith@Math.MsState.EDU REGULARITY AND DECOMPOSABILITY IN PLANAR ALGEBRAS

ABSTRACT: For a commutative semisimple Banach algebra A , let $\text{Reg } A$ denote the greatest regular subalgebra of A and let $\text{Dec } A$ denote those elements of A that induce decomposable (in the sense of Foias) multiplication operators on A . Michael Neumann showed that $\text{Dec } A$ consists of the hull-kernel continuous elements of A . Using this result, it is easy to see that $\text{Reg } A(K) = \text{Dec } A(K)$ where as usual $A(K) = \{f \in C(K) : f \text{ is analytic in the interior of } K\}$ for any compact set K in \mathbf{C} .

(80) **Ilya Spitkovsky**, College of William and Mary, Williamsburg, VA 23187-8795,
E-mail: ilya@MATH.WM.EDU CORONA PROBLEM AND ALMOST PERIODIC FACTORIZATION

ABSTRACT: Consider a triangular matrix function of the form

$$\begin{bmatrix} e^{i\lambda x} & 0 \\ f(x) & e^{-i\lambda x} \end{bmatrix},$$

where $\lambda > 0$ and $f(x) = \sum_j c_j e^{i\mu_j x}$. The factorization of such matrices arises naturally in the theory of convolution type equations on finite intervals, and is therefore important. However, only partial results

regarding the existence and construction of this factorization are presently known. In our talk, we will discuss recently discovered relations between this factorization and certain corona problems for almost periodic functions.

(81) **Karel Stroethoff**, University of Montana, Missoula, MT 59812, E-mail: ma_kms@selway.umt.edu
ALGEBRAIC PROPERTIES OF HARDY SPACE TOEPLITZ OPERATORS VIA THE BEREZIN TRANSFORM

ABSTRACT: In their paper “Algebraic Properties of Toeplitz Operators” (*J. Reine Angew. Math.* **213** (1963), 89–102), A. Brown and P.R. Halmos obtained various algebraic properties of Toeplitz operators on the Hardy space (see also chapter 25 in P.R. Halmos, *A Hilbert Space Problem Book*, 2nd Ed., Springer-Verlag, New York, 1982). They used matrices as well as measure theory to prove most of their results. We will give new proofs that will only make use of function theory.

(82) **Daniel F. Suarez**, University of Buenos Aires, Capital Federal, Argentina,
E-mail: dsuarez@mate.dm.uba.ar A VERSION OF RUNGE THEOREM FOR H^∞ .

ABSTRACT: Let E be a compact subset of the maximal ideal space \mathcal{M} of H^∞ , the algebra of bounded analytic functions on the open disk \mathbb{D} . A complex valued continuous function f on an open neighborhood U of E is called an analytic germ (on E) if the restriction of f to the disk is in $H^\infty(U \cap \mathbb{D})$. If $C(E)$ denotes the uniform algebra of continuous functions on E , let $H_{loc}^\infty(E)$ denote the closed subalgebra generated by analytic germs.

It can be shown that many of the uniform algebras naturally associated to H^∞ that appear in the literature have the form $H_{loc}^\infty(E)$. It is shown that every $f \in H_{loc}^\infty(E)$ can be uniformly approximated on E by ratios h/g , where $h, g \in H^\infty$ and g is zero free on E . Furthermore, if the set E coincides with its H^∞ -hull,

$$\hat{E} = \{\varphi \in \mathcal{M} : |\hat{f}(\varphi)| \leq \sup_E |\hat{f}| \text{ for all } f \in H^\infty\},$$

then the restriction of H^∞ to E is dense in $H_{loc}^\infty(E)$. These results are completely analogous to Runge’s rational and polynomial approximation theorems for compact subsets of the complex plane.

(83) **Paweł Szeptycki**, University of Kansas, Lawrence, KS 66045, USA, E-mail: szeptycki@KUHUB.CC.UKANS.EDU REMARKS ON THE EXTENDED DOMAIN OF THE FOURIER TRANSFORM

ABSTRACT: Together with G. Muraz we prove several descriptions of the largest solid space of measures whose Fourier transforms are measures. The results were conjectured by G. Muraz and were recently proved by Gulisashvili using less elementary methods.

(84) **Hiroyuki Takagi**, Shinshu University, Matsumoto, Japan 390-8621,
E-mail: htakagi@ripms.shinshu-u.ac.jp MULTIPLICATION AND COMPOSITION OPERATORS BETWEEN TWO L^p SPACES

ABSTRACT: In this talk, we determine the symbol functions that induce multiplication operators between two L^p spaces and the symbol transformations that induce composition operators between them. Moreover, we give the necessary and sufficient condition for those operators to have closed ranges.

(85) **Thomas Tonev**, University of Montana, Missoula, MT 59812-1032, E-mail: ma_tt@selway.umt.edu
BOURGAIN TYPE ALGEBRAS OF GENERALIZED ANALYTIC FUNCTIONS

ABSTRACT: We use inductive limits of algebras of classical analytic functions to describe Bourgain algebras of algebras of generalized analytic functions. Let $A \subset B$ be two commutative Banach algebras and $S_f : A \rightarrow B/A : g \mapsto \pi_A(fg)$ be the *Hankel type operator* on A . The *Bourgain algebra* A_b of A is the set of all elements f in B for which S_f is completely continuous.

Theorem Let $\{B_\sigma\}_{\sigma \in \Sigma}$, $\{A_\sigma\}_{\sigma \in \Sigma}$ be directed under inclusion systems of subalgebras of a commutative Banach algebra \mathcal{B} , let $B = \varinjlim_{\sigma \in \Sigma} B_\sigma$ and $A = \varinjlim_{\sigma \in \Sigma} A_\sigma$. If for every $\sigma \in \Sigma$ there is a bounded

linear mapping $r_s : B \rightarrow B_s$, such that $r_s|_{B_s} = \text{id}_{B_s}$, $r_s(fg) = fr_s(g)$ for every $f \in B_s$, $g \in B$, and $\sup_{\sigma \in \Sigma} \|r_s\| < \infty$, then $A_b \subset \left[\bigcup_{\sigma \in \Sigma} (A_\sigma)_b \right]$.

Let G be a compact abelian group with $\widehat{G} \subset \mathbb{R}$. A function $f \in L^1(G, d\sigma)$ is *generalized analytic* on G if its Fourier coefficients $c_x^f = \int_G f(g) \overline{\chi}(g) d\sigma$ are zero whenever $\chi < 0$. The *big disc algebra* A_G is the set of all continuous generalized analytic functions on G . If $\widehat{G} = \varinjlim_{\sigma \in \Sigma} \widehat{G}_\sigma$, where \widehat{G}_σ are subgroups of \widehat{G} , then $A_G = \left[\bigcup_{\sigma \in \Sigma} A_\sigma \right] = \left[\varinjlim_{\sigma \in \Sigma} A_\sigma \right]$ with $A_\sigma = \{f \in A_G : c_x^f = 0 \text{ for } \chi \notin \widehat{G}_\sigma\}$. As a corollary from the above theorem we obtain that $(A_G)_b = A_G$ for big disc algebras A_G with uncountable $\widehat{G} \subset \mathbb{R}$. Also, $(H_G^\infty)_b \subset H_G^\infty + C(G)$, where $H_G^\infty = \left[\bigcup_{\sigma \in \Sigma} H_\sigma^\infty \right] = \left[\varinjlim_{\sigma \in \Sigma} H_\sigma^\infty \right]$ and $H_\sigma^\infty = \{f \in H_G^\infty : c_x^f = 0 \text{ for } \chi \notin \widehat{G}_\sigma\}$. In the case when $\widehat{G} \subset \mathbb{R}$ is uncountable, we have that $(H_G^\infty)_b = H_G^\infty$.

Let $(A)_{wc}$ and $(A)_c$ be the sets of elements $f \in B$ with weakly compact, resp. compact, Hankel type operators S_f . If the hypotheses of the theorem are met, then $(A)_{wc} \subset \left[\bigcup_{\sigma \in \Sigma} (A_\sigma)_{wc} \right]$ and also $(A)_c \subset \left[\bigcup_{\sigma \in \Sigma} (A_\sigma)_c \right]$. As a corollary we obtain that the algebra H_G^∞ , as well as any big disc algebra with uncountable $\widehat{G} \subset \mathbb{R}$, is not tight or strongly tight.

(86) Abdelmajid Triki, University of Tunis, 106-Tunis, Tunisia, ON ALGEBRA HOMOMORPHISMS IN COMPLEX f -ALGEBRAS

ABSTRACT: In this talk we are mainly concern with generalization of a theorem due to E. Scheffold which states that if A is a Banach almost f -algebra (FF-algebra in his terminology), then any order bounded multiplicative linear form on A_C , the complexification of A , is Riesz homomorphism (lattice homomorphism). We show in different manner that in fact the latter result holds for an arbitrary order bounded algebra homomorphism between A_C and B_C , provided B is semiprime.

(87) Vladimir G. Troitsky, University of Illinois, Urbana, IL 61801, E-mail: vladimir@math.uiuc.edu THE MODULUS AND THE COMMUTANT OF C. J. READ'SS OPERATOR

ABSTRACT: Let $T : \ell_1 \rightarrow \ell_1$ be the quasinilpotent operator without an invariant subspace constructed by C. J. Read. We prove that the modulus of this operator has an invariant subspace (and, moreover, a positive eigenvector). This answers a question posed by Y. Abramovich, C. Aliprantis and O. Burkinshaw.

Furthermore, we construct three operators S_1 , S_2 and K (non-multiples of the identity) such that T commutes with S_1 , S_1 commutes with S_2 , S_2 commutes with K , and K is compact. This shows that the celebrated Lomonosov theorem cannot be improved by increasing the number of commuting operators connecting the given operator with a compact operator.

(88) Genrikh Ts. Tumarkin, 630 Rossmore Road, Goleta, CA 93117, USA, E-mail: tumarkin@gte.net SPECIAL TRANSFORMATIONS OF CAUCHY-TYPE INTEGRALS SPACES

ABSTRACT: We consider the space $K_p(G)$, $p \geq 1$, of analytic functions $f(z)$ representable by a Cauchy-Type Integral (CTI) in a simply-connected domain G , with a rectifiable boundary γ . We suppose that the density function ω of CTI is in $L_p(\gamma)$ and the complement G^- to the closure of G contains ∞ . The norm in the space $K_p(G)$ is naturally defined as the infimum of ω_{L_p} over all possible ω . Let $z = \varphi(w)$ ($z = \varphi_-(w)$) be a conformal mapping of the unit disk D onto G (or $w > 1$ onto G_- correspondingly). Using the mapping φ_- , we introduce a special isometric transformation of $K_p(G)$ onto $K_p(D)$ (for a general domain G) that allows us to get results on approximation of CTI by rational functions with preassigned poles. An important result of G. David (in case $p > 1$) describes the class of all domains for which the mapping $z = \varphi(w)$ induces the linear transformation of $K_p(G)$ into $K_p(D)$ ($f \rightarrow f(\varphi)[\varphi']^{1/p}$). Earlier (1961), the author introduced the class K of domains with similar property for $p = 1$. Now we investigate the properties of a more general class of domains, including David's and K classes. We give some applications to approximation problems.

(89) Maria Victoria Velasco-Collado, University of Granada, 18071 Granada, Spain, E-mail:

ABSTRACT: We investigate algebraic conditions on a normed algebra A , with a linear involution, ensuring that homomorphisms and derivations on A are continuous whenever they are continuous in the hermitian part of A . (This is a joint work with Angel Rodriguez-Palacios).

(90) **Keiichi Watanabe**, Niigata University, Niigata, Japan, and Indiana University, Bloomington, Indiana 47405, USA, E-mail: kwatanab@indiana.edu ON THE STRUCTURE OF ISOMETRIES BETWEEN NON-COMMUTATIVE L^p -SPACES

ABSTRACT: Development and present theory on the structure of isometries between non-commutative L^p -spaces associated with von Neumann algebras.

(91) **John Wermer**, Brown University, Providence, RI 02912, USA, E-mail: wermer@math.brown.edu BOUNDARIES OF ANALYTIC VARIETIES AND LINKING NUMBERS

ABSTRACT: The lecture will report on joint work with Herbert Alexander. Let M be a smooth, oriented, compact submanifold of the space of n complex variables. When does M bound an analytic variety V , of complex dimension p ? This problem was solved, giving certain moment conditions on M , by R. Harvey and B. Lawson, in 1975. Here we give "topological" conditions, involving the linking number of M with algebraic varieties of the appropriate dimension. We also identify the points of the variety V by a condition on the linking numbers.

(92) **Dirk Werner**, Free University of Berlin, 14195 Berlin, Germany, E-mail: werner@math.fu-berlin.de BANACH SPACES WITH THE DAUGAVET PROPERTY

ABSTRACT: An operator $T: X \rightarrow X$ on a Banach space X satisfies the *Daugavet equation* if

$$\|\text{Id} + T\| = 1 + \|T\|; \tag{1}$$

this terminology is derived from Daugavet's theorem that a compact operator on $C[0, 1]$ satisfies (1). Many authors have established the Daugavet equation for various classes of operators, e.g., the weakly compact ones, on various spaces; we refer to work by Abramovich, Kadets, Wojtaszczyk, and others.

A Banach space X is said to have the Daugavet property if every operator $T: X \rightarrow X$ of rank 1 satisfies $\|\text{Id} + T\| = 1 + \|T\|$. We show that then every weakly compact operator satisfies this equation as well and that X contains a copy of ℓ_1 . However, X need not contain a copy of L_1 . We also study pairs of spaces $X \subset Y$ and operators $T: X \rightarrow Y$ satisfying $\|J + T\| = 1 + \|T\|$, where $J: X \rightarrow Y$ is the natural embedding. This leads to the result that a Banach space with the Daugavet property does not embed into a space with an unconditional basis. In another direction, we investigate spaces where the set of operators with $\|\text{Id} + T\| = 1 + \|T\|$ is as small as possible and give characterizations in terms of a smoothness condition.

The talk is based on joint work with V. Kadets, R. Shvidkoy, and G. Sirotkin.

(93) **Wend Werner**, University of Paderborn, D-33095 Paderborn, Germany, E-mail: wend@math.uni-paderborn.de OPERATOR SYSTEMS WITHOUT UNIT

ABSTRACT: The Gelfand-Naimark theorem abstractly characterizes closed, *-invariant subalgebras of $L(H)$. An analogous result for subspaces of $L(H)$ that are *-invariant and contain the identity operator is due to Choi and Effros. In the present talk, we discuss the case in which the assumption on the identity in the Choi-Effros result has been dropped. We furthermore sketch the duality theory that goes with this new class of spaces and, if time permits, show how Hilbert space fits into this setting.

(94) **Geoffrey V. Wood**, University of Wales, Swansea, Wales, UK SA2 8PP, E-mail: G.V.Wood@swansea.ac.uk UNITARY BANACH ALGEBRAS

ABSTRACT: Let A be a Banach algebra. An element x in A is unitary if $\|x\| = \|x^{-1}\| = 1$. Denote by U (or U_A) the set of unitary elements in A . The algebra A is unitary if the closed convex hull of U is the unit ball of A . The Russo-Dye theorem shows that C^* -algebras are unitary and it is clear that for

discrete groups G , $l^1(G)$ is unitary. These two classes are surprising room-mates in the class of unitary algebras as in other ways they are very different. For example C^* -algebras have many hermitian elements while $l^1(G)$ has no non-trivial ones. In this talk, a survey of known results is given and some problems posed.

(95) Andriy Zagorodnyuk, Ukrainian Academy of Sciences, Lviv, 29061, Ukraine,
E-mail: sirand@mebm.lviv.ua ON MULTIPLICATIVE POLYNOMIAL OPERATORS ON TOPOLOGICAL ALGEBRAS

ABSTRACT: Let X and Y be complex topological algebras with identity and $P : X \rightarrow Y$ be a polynomial operator. We will say that P is multiplicative if $P(x_1x_2) = P(x_1)P(x_2)$ for each $x_1, x_2 \in X$. Let us denote by $\mathcal{P}_m(X, Y)$ the set of multiplicative polynomial operators, by $\mathcal{P}_m(^nX, Y)$ the set of n -homogeneous multiplicative polynomial operators and by $\mathcal{P}_{mb}(X, Y)$ the set of continuous multiplicative polynomial operators. The multiplicative polynomial operators have following properties:

- A multiplicative polynomial functional is necessary homogeneous.
- Let \bar{P} be a symmetric n -linear operator for polynomial operator $P : X \rightarrow Y$. Then $P \in \mathcal{P}_m(X, Y)$ if and only if $P(x)\bar{P}(x_1, \dots, x_n) = P(xx_1, \dots, xx_n)$ for each $x, x_1, \dots, x_n \in X$.
- If there is a open neighborhood of identity in group of invertible elements X^{-1} of algebra X then each multiplicative polynomial functional is continuous.

Let Y be defined by polynomial semisimple algebra if the set $R^\infty = \{y \in Y : P(z + y) = P(z), \forall P \in \mathcal{P}_{mb}(Y, \mathbb{C}), \forall z \in Y\}$ is empty.

Theorem Let X and Y be algebras Fréchet and X^{-1} containing a open neighborhood of identity and Y be a polynomial semisimple algebra. Then each multiplicative polynomial operator from X to Y is continuous.

Note that there are polynomial semisimple algebras which is not semisimple.

(96) Yong Zhang, University of Manitoba, Winnipeg, Manitoba R3T 2N2 Canada,
E-mail: umzhan20@cc.UManitoba.CA APPROXIMATE COMPLEMENTABILITY IN NORMED SPACES AND ITS APPLICATIONS IN THE STUDY OF NILPOTENT IDEALS OF BANACH ALGEBRAS

ABSTRACT: We introduce the concepts of approximately complemented subspaces of normed spaces and approximately biprojective algebras. We prove that any approximately biprojective Banach algebra with left and right approximate identities does not have a nontrivial nilpotent ideal whose closure is approximately complemented.

(97) Beate Zimmer, Mississippi University for Women, Columbus, MS 39701, USA,
E-mail: bzimmer@muw.edu NONSTANDARD PEAK FUNCTIONS

ABSTRACT: A nonstandard peak function is a $*$ -continuous function, whose support is contained in an infinitesimal neighborhood of a point. We show that a linear isometry maps peak functions to peak functions. We then investigate the images of peak functions under near-isometries.

(98) Nahum Zobin, Ohio State University, Columbus, OH 43210, USA,
E-mail: zobin@math.ohio-state.edu HITNEY'S PROBLEM ON EXTENDIBILITY OF FUNCTIONS AND AN INTRINSIC METRIC

ABSTRACT: We consider the space of functions with bounded k -th derivatives in a general domain in \mathbb{R}^n . Is every such function extendible to a function of the same class defined on the whole \mathbb{R}^n ? H. Whitney showed in 1934 that the equivalence of the geodesic metric in this domain to the Euclidean one is sufficient for such extendibility.. There was an old conjecture (going back to H. Whitney) that this equivalence is also necessary for extendibility. We disprove this conjecture in all dimensions starting from 2. The counterexamples are infinitely connected domains in \mathbb{R}^2 . It is possible to construct counterexamples in $\mathbb{R}^n, n > 3$ homeomorphic to balls, so no topological restrictions can help in dimensions 3 and higher. As for dimension 2 we prove that the Whitney's Conjecture is true for bounded finitely connected domains.