

The Fourth Conference on Function Spaces 2002 at SIUE

ABSTRACTS



María Dolores ACOSTA (dacosta@goliat.ugr.es), Department of Mathematical Analysis, University of Granada, 18071 Granada, Spain, *The alternative Dunford-Pettis property for subspaces of the compact operators.* **Saturday, 10:50AM, Lower Auditorium**

ABSTRACT. A Banach space X has the alternative Dunford-Pettis property if for every weakly convergent sequences $(x_n) \rightarrow x$ in X and $(x_n^*) \rightarrow 0$ in X^* with $\|x_n\| = \|x\| = 1$ we have $(x_n^*(x_n)) \rightarrow 0$. We get a characterization of certain operator spaces having the alternative Dunford-Pettis property. As a consequence of this result, if H is a Hilbert space we show that a closed subspace M of the compact operators on H has the alternative Dunford-Pettis property if, and only if, for any $h \in H$, the evaluation operators from M to H given by $S \mapsto Sh$, $S \mapsto S^t h$ are DP1 operators, that is, they apply weakly convergent sequences in the unit sphere whose limits are also in the unit

sphere into norm convergent sequences. We also prove a characterization of certain closed subalgebras of $K(H)$ having the alternative Dunford-Pettis property by assuming that the multiplication operators are DP1.



Pietro AIENA (paiena@unipa.it), Department of Mathematics, University of Palermo, 90123 Palermo, Italy, *Local spectral theory and Fredholm theory.* **Friday, 10:50AM, Lower Auditorium**

ABSTRACT. The *single valued extension property* (SVEP) has a basic importance in local spectral theory since is fulfilled by a wide variety of linear bounded operators of complex Banach spaces. In fact all decomposable operators have SVEP, while examples of non-decomposable operators which have SVEP may be found among the class all multipliers of semi-prime Banach algebras.

We shall describe a localized version of this property and will give several equivalent conditions to the SVEP at a point $\lambda_0 \in$. These equivalences also show how deeply Fredholm theory and local spectral theory interact. In fact many classical facts of Fredholm theory may be explained in terms of SVEP.

We also show that many classical results for normal operators acting in Hilbert spaces, relative to some spectra originating from the Fredholm theory, may be extended to decomposable operators.



John R. AKEROYD (jakeroyd@comp.uark.edu), Department of Mathematical Sciences, University of Arkansas, Fayetteville, AR 72701-1201, USA, *Some notes on the index of the shift.* **Friday, 3:30PM, Lower Auditorium**

ABSTRACT. If M is a closed invariant subspace for the shift on the Hardy space H^2 , then, by Beurling's Theorem, the codimension of zM in M is 1. In contrast, for any natural number n (and for n equal to infinity) there is a closed invariant subspace M for the shift on the Bergman space A^2 such that the codimension of zM in M is n . We examine the history of, and some recent results concerning, the conjecture that if $P^2(\mu)$ is an irreducible Hilbert space of analytic functions in the disk, then $P^2(\mu)$ shares the aforementioned property of H^2 precisely when $\mu(z : |z| = 1) > 0$.



Jeronimo ALAMINOS (alaminos@ugr.es) Department of Mathematical Analysis, University of Granada 18071 Granada, Spain. *Norm attaining bilinear forms on C^* -algebras.*

Tuesday, 5:10PM, Lower Auditorium

ABSTRACT. We give a sufficient condition on a C^* -algebra to ensure that every weakly compact operator into an arbitrary Banach space can be approximated by norm attaining operators. As a consequence we obtain the denseness of norm attaining bilinear forms on the set of all bounded bilinear forms on that C^* -algebras. Among others, the class of finite type I von Neumann algebras satisfies the condition.



Ernst ALBRECHT (ernstalb@math.uni-sb.de), FR 6.1 Mathematik, University of Saarlandes, Postfach 15 11 50, 66041 Saarbrücken, Germany, *Local Spectral Properties for Systems of Linear Differential Operators on L^p -Spaces.* *Wednesday, 9:50AM, Lower Auditorium*

ABSTRACT. On $L^2(\mathbb{R}^N)$ every constant coefficient linear partial differential operator $P(D)$ is normal and hence has a spectral measure and a rich functional calculus. For $p \neq 2$, there exists a spectral measure for $P(D)$ if and only if $P(D)$ is of order 0. In many cases (for example for elliptic operators) the operator $P(D)$ is still decomposable and has some sufficiently rich functional calculus. In this lecture, we consider perturbations of systems of ordinary linear differential operators by lower order differential operators with variable coefficients. Assuming a certain decay of these coefficients we still obtain at least locally (with more restrictive conditions even globally) spectral decomposition properties for the perturbed operator and locally a

functional calculus. The results have been obtained in joined work with Werner Ricker (Katholische Universität Eichstätt).



John T. ANDERSON (anderson@mathcs.holycross.edu), Department of Mathematics and Computer Science, College of the Holy Cross, Worcester, MA 01610-2395, USA, *Rational Approximation in C^2 .*

Wednesday, 4:20PM, Lower Auditorium

ABSTRACT. We consider the problem of approximating continuous functions on a compact set $X \subset C^n$ by rational functions holomorphic in a neighborhood of X . For $n = 1$, the theory is well-developed, but few general results are known in higher dimensions. We focus primarily on the case when X is a subset of the unit sphere $|z_1|^2 + |z_2|^2 = 1$ in C^2 , a setting in which it may be possible to prove results analogous to those on approximation in the plane.



Jesus ARAUJO (araujoj@unican.es), Facultad de Ciencias, Universidad de Cantabria, E-39005 Santander, Cantabria, Spain, *Realcompact spaces, automatic continuity and isometries.*

Tuesday, 11:30AM, Lower Auditorium

ABSTRACT. For realcompact spaces X, Y we give a complete description of the linear biseparating maps between spaces of vector-valued continuous functions on X and Y , special attention is paid to spaces of vector-valued *bounded* continuous functions. We prove that a biseparating map between spaces of vector-valued continuous functions is usually automatically continuous. However, we also discuss special cases when it is not true. Some of these results are applied to describe the linear isometries between spaces of vector-valued bounded continuous and uniformly continuous functions.

The talk is based on a joint work with Krzysztof Jarosz (kjarosz@siue.edu), Southern Illinois University, Edwardsville, USA.



Jorma ARHIPPAINEN (jarhippa@sun3.oulu.fi), Department of Mathematical Science, University of Oulu, FIN 90014, Finland, *On influence of regularity and weakly regularity of normed algebra to its Gelfand representation.* **Thursday, 3:30PM, Lower Auditorium**

ABSTRACT. We shall consider regularity and weakly regularity of normed and A -normed algebras and after that the influence of these concepts to the Gelfand representation of these algebras is studied. In this representation we shall use some weight functions on the Gelfand space to get a suitable topology for the Gelfand transform algebra. We shall also give an example of normed and A -normed algebra which is not weakly regular.



Hugo ARIZMENDI (hugo@servidor.unam.mx), Institute of Mathematics, National Autonomous University of Mexico, 04510 Mexico D.F., Mexico, *On the m -convexity of $C_b(X)$.* **Thursday, 3:55PM, Lower Auditorium**

ABSTRACT. Let X be a topological space and $C_b(X)$ the algebra of bounded continuous complex functions defined in X , with the strict topology β defined by R. Giles. In this paper a necessary and sufficient condition is given in order that $C_b(X)$ be an m -convex algebra, when X is a completely regular Hausdorff space. The density of principal ideals in this algebra and an algebra of analytic sequences are also studied.



Richard ARON (aron@mcs.kent.edu), Department of Mathematics, Kent State University, Kent, OH 44242, USA, *Algebras of symmetric holomorphic functions.* **Wednesday, 10:50AM, Lower Auditorium**

ABSTRACT. We study the algebra of uniformly continuous holomorphic symmetric functions on the ball of ℓ_p , investigating in particular the spectrum of such algebras. To do so, we examine the algebra of symmetric polynomials on ℓ_p -spaces as well as finitely generated symmetric algebras of holomorphic functions. As was pointed out by T. Tonev, even when ℓ_p is replaced by C^2 with the ℓ_p -norm, interesting and apparently difficult questions are encountered.

This is a joint work with R. L. Alencar, P. Galindo, and A. Zagorodnyuk.



Parthena AVRAMIDOU (avramido@math.uiuc.edu), Department of Mathematics, University of Illinois at Urbana-Champaign, Urbana, IL 61801, USA, *Convolution with approximate identities and pointwise convergence in $L_p(\mathbf{R})$, $p \geq 1$.* **Friday, 4:20PM, Upper Auditorium**

ABSTRACT. We construct approximate identities such that convolution is pointwise good a.e. in some $L_p(\mathbf{R})$, $p \geq 1$ and not in others. We also will discuss related results in Lebesgue differentiation.



Sheldon AXLER (axler@sfsu.edu), Mathematics Department, San Francisco State University, San Francisco, CA 94132, USA, *Harmonic Functions Done Right.* **Friday, 9:00AM, Lower Auditorium**

ABSTRACT. This talk will present a simple and clean approach to key results concerning harmonic polynomials and spherical harmonics.



Pradipta BANDYOPADHYAY* (pradipta@isical.ac.in) and **Sudipta DUTTA** (sudipta_r@isical.ac.in) Stat-Math Unit, Indian Statistical Institute, Kolkata, 700108, 203, B. T. Road, India, *Weighted Chebyshev Centers and Intersection Properties of Balls in Banach Spaces.* **Thursday, 5:10PM Upper Auditorium**

ABSTRACT. Banach spaces that admit weighted Chebyshev centres for finite sets were studied in [2] and subsequently, in [1], a large class of Banach spaces with this property were exhibited. Extending the notion of central subspaces introduced in [1], we define relative intersection properties for a subspace Y of a Banach space X with the centres of the balls coming from a given family of subsets of Y , the typical examples being those of finite, compact, bounded or arbitrary sets. We extend and improve upon some results of [1,2] in this general set-up and relate them with a modified notion

of minimal points. As in [1], special cases when we consider the family of all finite, or more interestingly, compact subsets lead to characterizations of L_1 -preduals. We also consider some stability results.

[1] Pradipta Bandyopadhyay and T. S. S. R. K. Rao, *Central Subspaces of Banach spaces*, J. Appro. Theory, **103** (2000), 206–222. [2] L. Veselý, *Generalized centers of finite sets in Banach spaces*, Acta Math. Univ. Comen., **66** (1997), 83–115.



Ehrhard BEHRENDS (behrends@math.fu-berlin.de), Fachbereich Mathematik und Informatik, Freie Universität Berlin, Arnimallee 2-6, 14195 Berlin, Germany, *Metric spaces with the small ball property.* **Thursday, 11:30AM, Lower Auditorium**

ABSTRACT. A metric space (M, d) is said to have the *small ball property* (*sbp*) if for every $\varepsilon_0 > 0$ it is possible to write M as a union of a sequence $(B(x_n, r_n))$ of closed balls such that the r_n are smaller than ε_0 and $\lim r_n = 0$. We study permanence properties and examples, the main results of this paper are the following: 1. Bounded convex closed sets in Banach spaces have the *sbp* only if they are compact. 2. Precisely the finite dimensional Banach spaces have the *sbp*. (More generally: a complete metric group has the *sbp* iff it is separable and locally compact.) 3. Let B be a boundary in the bidual of an infinite-dimensional Banach space. Then B does not have the *sbp*. In

particular the set of extreme points in the unit ball of infinite dimensional reflexive Banach spaces fails to have the *sbp*. The talk is based on a joint work with Vladimir Kadets.



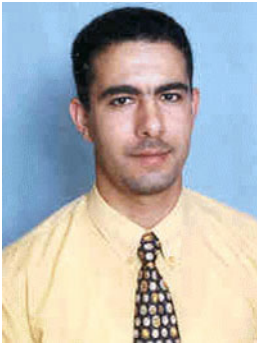
David BLECHER (dblecher@karazm.math.uh.edu), Department of Mathematics, University of Houston, Houston, TX 77204-3476, USA, *The nonsurjective Banach Stone theorem and the noncommutative Shilov boundary.* **Friday, 9:50AM, Lower Auditorium**

ABSTRACT. We describe the noncommutative Shilov boundary, and give some applications. For example we generalize the known characterizations of into isometries on function algebras, to operator algebras. Some of this is joint work with Hay and Labuschagne.



Karim BOULABIAR (bkarim@hilbert.math.olemiss.edu), Department of Mathematics, Facilte des Sciences de Bizerte, Zarzouna-Bizerte, Tunisia, *Representation Theorems of Lattice-Ordered Algebras. Saturday, 3:55PM, Lower Auditorium.*

ABSTRACT. This talk presents representation theorems of f -algebras, almost f -algebras and d -algebras in $C(X)$. It is a part of a survey about lattice-ordered algebras by Boulabiar, Buskes and Triki.



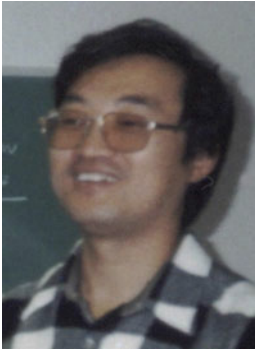
Abdellatif BOURHIM (bourhim@fsr.ac.ma; bourhim@ictp.trieste.it), Département de Mathématiques, Université Mohammed V, B.P.1014 Rabat, Maroc and The Abdus Salam International Centre for Theoretical Physics, Trieste, Italy, *Boundary behavior of holomorphic functions of bounded type. Friday, 5:35PM, Lower Auditorium*

ABSTRACT. We consider a function f of Nevanlinna class $N(\mathbb{D})$ such that its radial limit f_* is square summable on the unit circle \mathbb{T} . We give a growth condition on the Taylor coefficients of f and the rate of decrease of the negatively indexed Fourier coefficients of f_* in order that f must belong to Hardy class $H^2(\mathbb{D})$. This work has been done jointly with O. El-Fallah, and K. Kellay.



Eggert BRIEM (briem@rhi.hi.is), Department of Mathematics, University of Iceland, 3 Dunhaga, 107 Reykjavik, Iceland, *An extension of a theorem of Wermer, Bernard, Sidney and Hatori to algebras of functions on locally compact spaces. Saturday, 11:30AM, Lower Auditorium*

ABSTRACT. Let X be a compact Hausdorff space and B a uniformly closed subspace of $C(X, \mathbf{R})$ which separates the points of X and contains the constant functions. A version of the Stone-Weierstrass theorem says that if $b^2 \in B$ for all $b \in B$ then $B = C(X, \mathbf{R})$. This result does clearly not hold if, instead of assuming that B is uniformly closed, one assumes that B is a Banach space in some norm which dominates the sup-norm as the example of any non-trivial real Banach function algebra shows. However, if B is the real part of a uniform algebra, a theorem of J. Wermer says that if $b^2 \in B$ for all $b \in B$ then $B = C(X, \mathbf{R})$. Let us say that a real-valued function h , defined on an interval I of the real line, operates on B if $h \circ b \in B$ whenever $b \in B$ and b maps X into I . Thus, $b^2 \in B$ for all $b \in B$ means that $h(t) = t^2$ operates on B . The Stone-Weierstrass theorem was generalized by K. deLeeuw and Y. Katznelson, they showed that $h(t) = t^2$ can be replaced by any continuous non-affine function and the theorem of J. Wermer was similarly generalized by A. Bernard, S. Sidney and O. Hatori; here one can do without the continuity assumption, a function operating on the real part of a uniform algebra is automatically continuous. In case X is locally compact and B is a subspace of $C_0(X, \mathbf{R})$, the functional calculus for B may be non-trivial. What then about the real part of a uniformly closed subalgebra of $C_0(X, \mathbf{R})$? Wermer's theorem clearly extends to this situation. It turns out that the functional calculus is trivial for the locally compact case. To prove this one has to do more than just adapt the proofs for the compact case to the locally compact situation. The proofs in the compact case use the presence of the constant functions, especially the proof of continuity of the operating function and the proof of density of B in $C(X, \mathbf{R})$.



Qingying BU (qbu@math.kent.edu), Department of Mathematical Sciences, Kent State University, Kent, OH 44242, USA, *Types of Radon-Nikodym properties for the projective tensor product of ℓ_p and X .*

Wednesday, 4:20PM, Upper Auditorium

ABSTRACT. Let X be a Banach space and $1 < p < \infty$. Then $\ell_p \hat{\otimes} X$, the projective tensor product of ℓ_p and X , has the Radon-Nikodym property (resp. analytic Radon-Nikodym property, non-containment of a copy of c_0) if and only if X does.



Gerard BUSKES (mmbuskes@hilbert.math.olemiss.edu), Department of Mathematics, University of Mississippi, MS 38655, USA, *Completions of Lattice Ordered Algebras.*

Saturday, 3:30PM, Lower Auditorium

ABSTRACT. This talk presents a smorgasbord of results from a survey of lattice-ordered algebras by Boulabiar, Buskes and Triki. This part will focus on the various completions of f -algebras, almost f -algebras and d -algebras.



Audrey CURNOCK* (curnoca@sbu.ac.uk), School of Computing and Mathematics, South Bank University, London SE1 0AA, 103 Borough Road, England; **J. D. HOWROYD** (mas01jdh@gold.ac.uk), Department of Mathematical Sciences, Goldsmiths College, University of London, London SE14 6NW, England; **N-C. WONG** (wong@math.nsysu.edu.tw), Department of Applied Mathematics, National Sun Yat-sen University, Kaohsiung 80424, Taiwan, R.O.C., *Isometries of Affine Function Spaces.*

Thursday, 4:20PM, Upper Auditorium

ABSTRACT. We characterize surjective linear isometries between affine function spaces and also extend the Banach–Stone theorem to this setting. Let K and S be compact convex sets. Then every surjective linear isometry T between affine function spaces $A(K)$ and $A(S)$ is a product of a composition operator with a skew isometry. In addition, every such T induces an affine homeomorphism between K and S if, and only if, either K or S is skew symmetric. Further, every such T is a weighted composition operator if, and only if, either K or S has the property that every closed parallel face is split. A sufficient condition for the latter property is the unique decomposition property, which is shared by, for example, state spaces of C^* -algebras. We also give some illustrative geometric examples. Finally, we give some illustrative geometric examples.



Thomas William DAWSON (pmxtwd@nottingham.ac.uk), School of Mathematical Sciences, University of Nottingham, University Park, Nottingham NG7 2RD, United Kingdom, *On The Denseness of the Invertible Group in Banach Algebras.*

Thursday, 5:10PM, Lower Auditorium

ABSTRACT. We examine the condition that a complex Banach algebra A have a dense invertible group. We show that, for commutative algebras, this property is preserved by integral extensions. We also investigate the connections with an old problem in the theory of uniform algebras.



Geoff DIESTEL (mathgr40@math.missouri.edu), Mathematics Department, 202 Mathematical Sciences Building, University of Missouri, Columbia, MO 65211, USA *Sobolev Spaces with Trivial Isometries.*
Wednesday, 5:10PM, Upper Auditorium

ABSTRACT. For a bounded domain $E \subset \mathbb{R}^n$, $p > 0$ and $k \in \mathbb{N}$ we consider the Sobolev space $W_p^k(E)$ of k -times continuously differentiable real-valued functions f on E equipped with the norm $\|f\|^p = \|f\|_{L_p(E)}^p + \sum_{1 \leq |\alpha| \leq k} \|D^\alpha f\|_{L_p(E)}^p$, where $D^\alpha f = \frac{\partial^{|\alpha|} f}{\partial x_1^{\alpha_1} \dots \partial x_n^{\alpha_n}}$ and $|\alpha| = \sum_{j=1}^n \alpha_j$ for multiindices $\alpha = (\alpha_1, \dots, \alpha_n)$ and $\alpha_j \in \mathbb{N} \cup \{0\}$ for $1 \leq j \leq n$. In this note we show that if p is not an even integer then the structure of linear (surjective) isometries of the spaces $W_p^k(E)$ strongly depends on the geometry of the domain E . We prove the following. Let E and G be closed bounded connected domains in \mathbb{R}^\times such that $m(E \setminus \text{int}(E)) = 0$. Let $p > 0$, $p \notin 2\mathbb{N}$ and $k \in \mathbb{N}$. Then the space $W_p^k(E)$ is isometric to $W_p^k(G)$ if and only if the domains E and G coincide up to the composition of a translation and a sign-changing permutation of coordinates.



Ian DOUST (i.doust@unsw.edu.au), School of Mathematics, University of New South Wales, Sydney 2052, Australia, *Conditional and unconditional decompositions of noncommutative L^p spaces.*
Wednesday, 11:30AM, Lower Auditorium

ABSTRACT. The concept of ‘ R boundedness’ has appeared in a number of papers over the past few years and appears to be a concept of growing importance. It has been used, for example, in recent important work of Kalton and Weis and of Le Merdy, concerning H^∞ functional calculus and maximal regularity, and of Celèment, de Pagter, Sukochev and Witvliet on decompositions of Banach spaces. This concept seems to have been distilled by Berkson and Gillespie in their 1994 paper from some earlier ideas of Bourgain. In this talk I will show how this concept is used in to proving some

theorems that can be thought of, either as concerning particular types of decomposition of Banach spaces, or else concerning particular types of functional calculus. As particular applications of these theorems we get analogues of classical theorems of harmonic analysis, but now acting on the von Neumann-Schatten spaces C_p rather than on the Lebesgue spaces L^p . This is joint work with T.A. Gillespie.



Patrick N. DOWLING (dowlinpn@muohio.edu), Department of Mathematics and Statistics, Miami University, Oxford, Ohio 45056, USA, *Subsets of c_0 failing the fixed point property.*
Tuesday, 4:20PM, Upper Auditorium

ABSTRACT. In 1998, Llorens-Fuster & Sims gave examples of closed bounded convex subsets of c_0 which are not weakly compact but are *close to weakly compact* and yet they fail to have the fixed point property for nonexpansive mappings. Based on these examples they conjectured that the only closed bounded non-empty subsets of c_0 which have the fixed point property are the weakly compact ones. We give examples of subsets of c_0 that are different than those of Llorens-Fuster & Sims and they also fail the fixed point property. This is joint work with Chris Lennard & Barry Turett.



John DUNCAN, (jduncan@comp.uark.edu), Department of Mathematical Sciences, University of Arkansas, Fayetteville, AR 72701-1201, *Extremal Problems for Hermitians: Progress and Roadblocks.*
Thursday, 1:30PM, Lower Auditorium

ABSTRACT. An element h of a complex unital Banach algebra A is *hermitian* if $\|\exp(ith)\| = 1$ for all real t . The extremal behavior for algebras generated by one or two hermitians is well understood. We discuss recent progress on the implications of imposing algebraic and other conditions on the generators; in particular the surprising result that the extremal algebra on two hermitian generators u, v with $u^2 = v^2 = 1$ is C^* -equivalent to the C^* -algebra of the infinite dihedral group.

On the other hand, some older problems stubbornly resist progress. Given that h, k, hk are hermitian, does it follow that $hk = kh$? Even more primitively, what are the best bounds relating $\|h + ik\|$ and $\|h - ik\|$ when h, k are hermitian?



Jose EXTREMERA (jlizana@ugr.es) Department of Mathematical Analysis, University of Granada 18071 Granada, Spain. *Uniqueness of translation invariant norms in nonabelian context.*

Wednesday, 3:30PM, Upper Auditorium

ABSTRACT. Let G be a compact group. If the trivial representation of G is not weakly contained in the left regular representation of G on $L_0^2(G)$ and X is either $L^p(G)$ for $1 < p \leq \infty$ or $C(G)$, then we show that every complete norm $|\cdot|$ on X that makes translations from $(X, |\cdot|)$ into itself continuous is equivalent to $\|\cdot\|_p$ or $\|\cdot\|_\infty$ respectively. If $1 < p \leq \infty$ and every left invariant linear functional on $L^p(G)$ is a constant multiple of the Haar integral, then we show that every complete norm on $L^p(G)$ that makes translations from $(L^p(G), |\cdot|)$ into itself continuous and that makes the maps $t \mapsto L_t, R_t$ from G into $B(L^p(G), |\cdot|)$ bounded is equivalent to $\|\cdot\|_p$.



Joel FEINSTEIN (jff@maths.nott.ac.uk), School of Mathematical Sciences, University of Nottingham, Nottingham NG7 2RD, England, *Endomorphisms of algebras of infinitely differentiable functions on compact plane sets.*

Tuesday, 2:20PM, Lower Auditorium

ABSTRACT. This is joint work with Professor H. Kamowitz. This research was supported by two grants from the EPSRC: GR/M31132 and GR/R09589. For further details see <http://www.maths.nottingham.ac.uk/personal/jff/EPSRC/>. We investigate the endomorphisms of the Dales-Davie algebras of infinitely differentiable functions on compact plane sets, especially compact intervals. We investigate which self-maps of the plane sets induce endomorphisms of the algebras, when the endomorphisms are compact and what the spectra of these endomorphisms are.



Walden FREEDMAN (wf6@humboldt.edu), Dept. of Mathematics, Humboldt State Univ., Arcata, CA 95521, USA, *An extension property for Banach spaces.*

Tuesday, 5:10PM, Upper Auditorium

ABSTRACT. A Banach space X has property (E) if every operator from X into c_0 extends to an operator from X^{**} into c_0 ; X has property (L) if whenever K is a bounded subset of X which is limited in X^{**} , then K is limited in X ; the space X has property (G) if whenever K is a bounded subset of X which is a Grothendieck subset of X^{**} , then K is a Grothendieck subset of X . In all of these, we consider X as canonically embedded in X^{**} . We study these properties in connection with other geometric properties, such as the Phillips properties, the Gelfand-Phillips and weak Gelfand-Phillips properties, and the property of being a Grothendieck space.



Theodore W. GAMELIN (twg@math.ucla.edu), Department of Mathematics, University of California Los Angeles, CA 90095-1555, USA, *Homomorphisms of uniform algebras.*

Tuesday, 9:00AM, Lower Auditorium

ABSTRACT. We discuss compact and weakly compact homomorphisms of uniform algebras. The main result is that if the composition operator on a uniform algebra induced by ϕ is weakly compact, then ϕ has a finite number of attracting cycles, to which the iterates of ϕ converge. This extends work of H. Kamowitz and U. Klein covering compact homomorphisms of uniform algebras. The proof involves "hyperbolically unbounded" sequences in the spectrum of a uniform algebra.



Stanislaw GOLDSTEIN (goldstei@math.uni.lodz.pl), Faculty of Mathematics, University of Łódź, ul. Banacha 22, 90-238 Łódź, Poland, *On a measure independent construction of noncommutative L^p spaces.*

Friday, 3:55PM, Upper Auditorium

ABSTRACT. There are two well known constructions of noncommutative L^p spaces that enable us to conveniently deal with their multiplicative structure: a spatial one due to Connes and Hilsun and a non-spatial one due to Haagerup and described in detail by Terp. The spatial L^p spaces over a von Neumann algebra M acting in a Hilbert space H depend on the choice of a weight on the commutant M' . The Haagerup spaces, on the other hand, should be 'measure independent'. Unfortunately, they are realized as spaces of measurable operators affiliated to the crossed product of M by a modular

automorphism group, so a choice of a specific state or weight on M seems unavoidable. We show how to amend the situation by constructing, for each von Neumann algebra M , a semifinite algebra N which plays a role of the crossed product but does not depend on any particular choice of 'measure' on M .

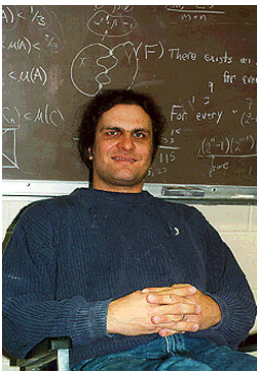


Pamela GORKIN (pgorkin@bucknell.edu), Department of Mathematics, Bucknell University, Lewisburg, PA 17837, USA, *Homotopic Composition Operators.*

Saturday, 9:50AM, Lower Auditorium

ABSTRACT. For a self-map of the unit disk D and the Hardy space H^2 Berkson showed that certain composition operators are isolated from all other composition operators (in the operator norm topology on H^2). Shapiro and Sundberg studied this problem and posed several interesting related questions about composition operators on H^2 . MacCluer, Ohno and Zhao studied these questions in a different setting: the composition operators were considered on the space of bounded analytic functions on the open unit disk, $H^\infty(D)$. They obtained necessary and sufficient conditions for such operators to be isolated. The question of when such operators are essentially isolated was answered by Hosokawa, Izuchi and Zheng using a certain type

of interpolating sequence. In this talk we unify, simplify and extend these results by determining the path connected and essential path connected components of the set of composition operators on H^∞ of the ball in C^n . We use these same techniques to characterize the path components of endomorphisms of H^∞ on the disk, continuing research begun by Udo Klein.



Daniel GRUBB (grubb@math.niu.edu), Dept. of Mathematical Sciences, Northern Illinois Univ., DeKalb, IL 60115, USA, *Quasi-measures and Quasi-linear maps.*

Tuesday, 3:55PM, Upper Auditorium

ABSTRACT. A map $\rho : C(X) \rightarrow C(Y)$ between spaces of continuous functions is called quasi-linear if it is linear on each singly generated subalgebra of $C(X)$. The definition of a quasi-linear functional is similar. We show that the collection of all bounded quasi-linear functionals on $C(X)$ has a Banach space dual which can be made into an ordered Banach space. In general, this space is not a lattice, however. We next look at the structure of positive quasi-linear maps which leads to the concept of a generalized image transformation. A structure theorem is given in terms of a universal space for quasi-linear maps. Several non-trivial examples will be given and methods of computation involving quasi-measures will be presented.



Vladimir I. GURARIY, (Gurariy@aol.com), Department of Mathematics, Kent State University, Kent, OH 44242, USA, *Linability and Spaceability of sets in Function Spaces.*

Wednesday, 3:55PM, Upper Auditorium

ABSTRACT. The set M in a linear topological space X is said to be linable (corresp., spaceable) if there exists an infinite-dimensional linear manifold (corresp. subspace) Y in X such that Y is a subset of M . We review recent results and unsolved problems of the author and of P. Enflo, M. Kadec, V. Fonf, L. Rodrigues-Piazza and others. These results in particular include the following (last two of them are in process of publishing).

Theorem 1 (V.I.Gurariy, 1966) The set D of all differentiable functions on $[0, 1]$ is not spaceable in $C[0, 1]$

Theorem 2 (V.Fonf, V.I.Gurariy, M.Kadec, 1990) The set of all continuous nowhere differentiable functions on $[0, 1]$ is spaceable in $C[0, 1]$.

Theorem 3. (P.H.Enflo, V.I.Gurariy, 2001) For any infinite-dimensional subspace X in $C[0, 1]$ the set Z of all functions in X with infinitely many zeroes on $[0, 1]$ is spaceable.

Theorem 4. (V.I.Gurariy and coauthors, 2002) The set DNM of all differentiable nowhere monotone functions on $[0, 1]$ is linal and not spaceable in $C[0, 1]$.



Marina HARALAMPIDOU (mharalam@cc.uoa.gr), Department of Mathematics, University of Athens Panepistimioupolis, GR-157 84, Athens, Greece, *The Krull nature of locally C^* -algebras.*

Tuesday, 3:55PM, Lower Auditorium

ABSTRACT. Any complete locally m -convex algebra, whose normed factors in its Arens-Michael decomposition are Krull algebras is also Krull. In particular, any locally C^* -algebra is Krull. Considering perfect projective systems, we give another proof of the fact that any Fréchet locally C^* -algebra is Krull. Furthermore, a unital proper complete locally m -convex H^* -algebra with continuous involution is a locally C^* -algebra and hence Krull. The class of Krull (topological) algebras is closed with respect to Cartesian products, topological algebra isomorphic images, and perfect projective limits.



Alexander J. IZZO (aizzo@bgsu.edu; aizzo@math.tamu.edu), Department of Mathematics & Statistics, Bowling Green State University, Bowling Green, OH 43403, and Department of Mathematics, Texas A&M University, College Station, TX 77843, *Uniform approximation on manifolds.*

Thursday, 2:20PM, Lower Auditorium

ABSTRACT. John Wermer (1965) shows that if f is a complex-valued continuously differentiable function on the closed unit disc \bar{D} such that the graph of f is polynomially convex and E is the zero set of $\partial f/\partial \bar{z}$, then the uniformly closed algebra generated by z and f contains every continuous function on \bar{D} that vanishes on E . M. Freeman (1966) generalized this result to the context of uniform algebras on two-dimensional manifolds by proving that if A is a uniform algebra generated by a family Φ of C^1 -functions on a compact two-dimensional (real) C^1 -manifold-with-boundary M , the maximal ideal space of A is M , and E is the set of points where the differentials of the functions in Φ fail to span the complexified cotangent space to M , then A contains every continuous function on M that vanishes on E . Freeman then asked whether this theorem holds also for uniform algebras on manifolds of higher dimension. Under stronger hypotheses, affirmative answers were obtained by numerous authors. In this talk, Freeman's original question will be completely answered.



Farhad JAFARI (fjafari@uwyo.edu), Department of Mathematics, University of Wyoming, Laramie, WY 82071-3036, USA, *An extension theorem of Morse.*

Thursday, 4:45PM, Lower Auditorium

ABSTRACT. This talk will describe an extension theorem of Morse and its application to identifying isometries of certain Fréchet algebras.



James E. JAMISON (jjamison@memphis.edu), University of Memphis, Memphis, TN 38152, USA, *Some Results on Isometric Equivalence Operators on Banach Space.*

Tuesday, 3:30PM, Upper Auditorium

ABSTRACT. Let X be a Banach Space and $B(X)$ the bounded linear operators on X . Two elements S and T of $B(X)$ are said to be isometrically equivalent if there exists an invertible isometry U on X such that $SU = UT$. We give necessary and sufficient conditions for certain operators on specific Banach spaces to be isometrically equivalent.



Hans JARCHOW (jarchow@math.unizh.ch), Mathematical Institute, University of Zurich, Winterthurerstr 190, CH 8057 Zurich, Switzerland, *Carleson embeddings for weighted Bergman spaces.*

Tuesday, 10:50AM, Lower Auditorium

ABSTRACT. Continuing earlier work of D.H. Luecking, we discuss (finite Borel) measures μ on the open complex unit disk which have the property that, given $\alpha > -1$ and $0 < p, q < \infty$, A_α^p is a subset of $L^q(\mu)$. The A_α^p are the classically weighted Bergman spaces. We will recall Luecking's criteria on boundedness of the embedding $A_\alpha^p \hookrightarrow L^q(\mu)$, and then concentrate on compactness, order boundedness, and related summing properties of this embedding.

This is a joint project with Urs Kollbrunner.



Michal JASICZAK (mjk@amu.edu.pl), Faculty of Mathematics and Computer Science, Adam Mickiewicz University, 60-769 Poznań, Poland, *On the continuity of the Bergman projection in the unit ball and the locally convex extension of H^∞ .*

Friday, 4:45PM, Lower Auditorium

ABSTRACT. The Bergman projection in the unit ball does not map the space L^∞ into H^∞ . We define locally convex spaces LW and HW consisting of measurable and holomorphic functions respectively, with topology given by weighted - sup seminorms. It is proved that the Bergman projection is a continuous map from LW onto HW . The spaces are the smallest among spaces having these properties. Some locally convex and algebraic properties of these extensions are also investigated.



Robert KANTROWITZ (rkantrow@hamilton.edu), Department of Mathematics, Hamilton College, Clinton, NY 13323, USA, *Irrotational and rotational square roots.*

Tuesday, 4:45PM, Lower Auditorium

ABSTRACT. A square root of an invertible element of a unital Banach algebra is categorized as irrotational if its spectrum fails to intersect the spectrum of its additive inverse; otherwise it is categorized as rotational. In this talk, we shall consider examples of irrotational and rotational square roots of elements chosen from finite dimensional algebras, the algebra of bounded operators on a Hilbert space, and the algebra of bounded operators on a Banach algebra. The examples will serve also to motivate discussion of general properties of irrotational and rotational square roots of invertible

elements of a Banach algebra.



H. Turgay KAPTANOGLU (kaptan@math.metu.edu.tr), Department of Mathematics, Middle East Technical University, Ankara 06531, Turkey, *A New Look at Diagonal Besov Spaces on the Ball.*

Wednesday, 4:45PM, Lower Auditorium

ABSTRACT. A more natural definition of diagonal Besov spaces B_s^p on the unit ball is given that categorizes them the same way as weighted Bergman spaces. The definition depends on a class of fractional-order radial differential operators. A Forelli-Rudin-type theorem is proved to consider $0 < p < 1$. Bergman projections on, duality and complex interpolation between these spaces are investigated. A certain family of these spaces are related to the minimal Möbius-invariant space \mathcal{M} . There are also consequences for the Bloch space and the Hardy space H^2 .



Mienie De KOCK (mdekock@math.kent.edu), Department of Mathematics, Kent State University, Kent, OH 44242, USA, *Operators Defined By Conditional Expectations.*

Thursday, 4:45PM, Upper Auditorium

ABSTRACT. A description of positive, order continuous projections in ideals of measurable functions is given in terms of conditional expectation-type operators. The dual of such an operator can also be represented as a conditional expectation operator. We use this result in order to characterize conditional expectation in terms of a positive, order continuous projection that preserves one, and such that an extension of the dual also preserves one.



Alexander KOLDOBSKY (koldobsk@math.missouri.edu), Mathematics Department, 202 Mathematical Sciences Building, University of Missouri, Columbia, MO 65211, USA *Intersection bodies and L_p -spaces.*

Thursday, 9:50AM, Lower Auditorium

ABSTRACT. We extend the concept of embedding of normed spaces in L_p to negative values of p and show several applications to convex geometry, including characterizations of intersection bodies and results of Busemann-Petty type.



Steven G. KRANTZ (sk@math.wustl.edu), Department of Mathematics, Washington University, St. Louis, MO 63130, USA, *Fixed points of holomorphic mappings.* *Tuesday, 9:50AM, Lower Auditorium*

ABSTRACT. We study the number of fixed points that a conformal mapping of a domain in the plane, or a biholomorphic mapping of a domain in n -dimensional complex space, can have. The principal technique is to use Bergman geometry, particularly the geometry of geodesics. A number of theorems and also counterexamples will be provided. This is joint work with Buma Fridman, Kang-Tae Kim, and Daowei Ma.



Mark LAWRENCE (lawrence@math.brown.edu), Dept. of Mathematics, Brown Univ., Providence, RI 02912, USA, *The CR Hartogs theorem and related topics.* **Friday, 3:55PM, Lower Auditorium**

ABSTRACT. The classical Hartogs' theorem that separately holomorphic functions in \mathbf{C}^n are holomorphic is almost 100 years old. There is a natural analog of this question for identifying *CR* functions on the boundary of a domain in \mathbf{C}^n . This question has been examined by a few people, but not one positive result in this direction has been achieved until now. I will present a proof of the *CR* Hartogs theorem for a particular domain in \mathbf{C}^2 for real analytic boundary functions. I will also discuss a related and new problem of 1 complex variable. All questions for less than real analytic regularity remain open; furthermore, these problems give rise to interesting function algebras and function spaces. The problems arising are difficult because they resist localization; moreover, it is not clear if there are any approximation theorems.



Åsvald LIMA (Asvald.Lima@hia.no), Department of Mathematics, Agder College, Serviceboks 422, 4604 Kristiansand, Norway, *Hahn-Banach extension operators and spaces of operators.* **Friday, 2:20PM, Lower Auditorium**

ABSTRACT. We shall study Hahn-Banach extension operators $\Phi : \mathcal{F}(Z, X)^* \rightarrow \mathcal{L}(Z, X^{**})^*$, and $\Phi : \mathcal{F}(Z, X)^* \rightarrow \mathcal{W}(Z, X^{**})^*$. When do Φ exist? If Φ exists, can we describe how Φ looks like? We shall show that the existence of Φ is closely connected to the approximation property for X or X^* .

My talk will report on recent work by Åsvald Lima, Vegard Lima and Eve Oja.



Ching On LO (colo@graduate.hku.hk), Department of Mathematics, University of Hong Kong, Hong Kong, *Weighted composition operators between L^p -spaces.* **Friday, 4:45PM, Upper Auditorium**

ABSTRACT. Let (X, Σ, μ) and (Y, Γ, ν) be two σ -finite and complete measure spaces. For a Γ -measurable function $u : Y \rightarrow \mathbb{C}$ and a non-singular measurable transformation $\varphi : Y \rightarrow X$, we define a linear map uC_φ from $L^p(\mu)$ ($1 \leq p \leq \infty$) into the linear space of all Γ -measurable functions on Y by $uC_\varphi f := u \cdot (f \circ \varphi)$. This map is known as the weighted composition operator. Such kind of operators appears in various contexts in the literature. However, there are relatively few results about the properties of these operators between two distinct L^p -spaces. In this talk, we characterize the boundedness and compactness of these operators between L^p -spaces.



Victor LOMONOSOV (lomonoso@mcs.kent.edu), Department of Mathematics, Kent State University, Kent, OH 44242, USA, *A Counterexample to the Bishop-Phelps Theorem in Complex Spaces.* **Thursday, 10:50AM, Lower Auditorium**

ABSTRACT. If S is a subset of a Banach space X , then a nonzero functional f is a support functional for S and a point x in S is a support point of S if f attains maximum of absolute value at the point x . In 1958 Victor Klee asked if each closed bounded convex subset of a Banach space must have a support point. In 1961 E.Bishop and R.R.Phelps in their fundamental paper proved that the set of support functionals for a closed bounded convex subset S in a real Banach space X is norm dense in the dual space. We are going to present a construction of a complex Banach space X with a closed

bounded convex subset S such that the set of the support points of S is empty. We show also that if the Bishop-Phelps Theorem is correct for a uniform dual algebra R of operators in a Hilbert space, then the algebra R is selfadjoint.



Manuel MAESTRE (maestre@uv.es), Faculty of Mathematics, University of Valencia, 46100 Burjassot - Valencia, Spain, *On Bohr's power series theorem.* **Tuesday, 4:45PM, Upper Auditorium**

ABSTRACT. In 1914 Harald Bohr published the following surprising result: Suppose that we have $|\sum_{k=0}^{\infty} a_k z^k| \leq 1$ for each complex number z in the open unit disk. Then $\sum_{k=0}^{\infty} |a_k z^k| \leq 1$ when $|z| < \frac{1}{3}$, and moreover the radius $\frac{1}{3}$, is best possible. Recently several authors studied Bohr's power series theorem in higher dimension: Given a Banach space $X = (\mathbb{C}^n, \|\cdot\|)$, what is the largest radius $K(B_X)$ (called Bohr radius of the open unit ball of X) such that if $|\sum_{\alpha} a_{\alpha} z^{\alpha}| \leq 1$ for all $\|z\| < 1$, then $\sum_{\alpha} |a_{\alpha} z^{\alpha}| \leq 1$ when $\|z\| < K(B_X)$? A result of Dineen-Timoney, and Boas-Khavinson states that the scalar sequence $(K(B_{\ell_{\infty}^n}))$ tends to zero, and that its decay is essentially like $\frac{1}{\sqrt{n}}$. We link this cycle of ideas around multi-variable powers series with

local Banach space theory, in particular with our recent research on unconditionality in spaces of m -homogeneous polynomials on X . Estimates for $K(B_X)$ are then obtained by probabilistic methods. The main probabilistic tool we obtain and apply is an estimate for the expectation of the norm of Gaussian random polynomials on Banach spaces. This is a polynomial counterpart of an important inequality due to Chevet.



Jasbir Singh MANHAS (manhas@squ.edu.om), Department of Mathematics and Statistics, Sultan Qaboos University, Muscat, Sultanate of Oman, *Multiplication Operators on Weighted Locally Convex Spaces of Vector-Valued Analytic Functions.* **Wednesday, 4:45PM, Upper Auditorium**

ABSTRACT. Let V be an arbitrary system of weights on an open connected subset of n -dimensional complex space and let $B(E)$ be the Banach algebra of all bounded linear operators on a Banach space E . Let $HVb(G, E)$ and $HV0(G, E)$ be the weighted locally convex spaces of vector-valued holomorphic functions with topology generated by seminorms which are weighted analogues of the supremum norm. In the present paper, we characterize the operator-valued holomorphic functions from G into $B(E)$ which generate multiplication operators and invertible multiplication operators on the

spaces $HVb(G, E)$ and $HV0(G, E)$ for different systems of weights V on G . Also, we obtained a linear dynamical system associated with these multiplication operators.

Michael MARSALLI (marsalli@ilstu.edu), Department of Mathematics, Illinois State University, Normal, Illinois 61790-4520, USA, *On L^2 -precompactness of the ball of a function algebra.* **Thursday, 5:35PM, Lower Auditorium**

ABSTRACT. Let μ be a finite, positive, compactly supported, Borel measure on \mathbb{C} . Let A be a unital subalgebra of $L^{\infty}(\mu)$. We consider the problem of determining when the unit ball of A is precompact in $L^2(\mu)$, and we solve the problem for several classical function algebras.



Len MILLER (miller@math.msstate.edu), Department of Mathematics and Statistics, Mississippi State University, Mississippi State, MS 39762, USA, *Local spectral properties of averaging operators on the Hardy spaces.* **Wednesday, 3:55PM, Lower Auditorium**

ABSTRACT. We consider operators T_F on the Hardy spaces H^p given by

$$T_F f(z) = \frac{1}{z} \int_0^z f(\zeta) \frac{1}{F(\zeta)} d\zeta$$

where F is analytic on the unit disk and $\operatorname{Re} F(z) \geq 0$. This class was originally studied by A. Siskakis, who showed that they were bounded and gave a function-theoretic characterization of the symbols F for which T_F is compact. In this work, we begin the study of local spectral properties of these

operators, specifically, Bishop's property (β) .



Michael M. NEUMANN (neumann@math.msstate.edu), Department of Mathematics and Statistics, Mississippi State University, Mississippi State, MS 39762, USA, *Localization in the spectral theory of operators on Banach spaces. Thursday, 9:00AM, Lower Auditorium*

ABSTRACT. The talk will survey some of the recent developments in the local spectral theory of operators on Banach spaces. Particular emphasis will be on the theory of decomposable operators and their restrictions to closed invariant subspaces. In addition, the relevance of certain localized versions of some of the standard conditions from local spectral theory will be discussed. The theory will be exemplified in the case of isometries, convolution operators, weighted shifts, and certain operators on Hilbert spaces.



Shuichi OHNO (ohno@nit.ac.jp), Nippon Institute of Technology, Miyashiro, Minami-Saitama 345-8501, Japan, *Products of Composition and Toeplitz Operators. Friday, 4:20PM, Lower Auditorium*

ABSTRACT. We will consider the problem of which the products of composition and Toeplitz operators would be bounded or compact on the Hardy and Bergman spaces. This is a joint work with J. S. Choa.



Fabila Maria de LOURDES PALACIOS (pafa@xanum.uam.mx), Department of Mathematics, Autonomous Metropolitan University (UAM), Iztapalapa (Iztapalapa) Campus, 09340 México DF, Mexico, *On the α -dual algebra. Tuesday, 3:30PM, Lower Auditorium*

ABSTRACT. In [H. Arizmendi, A. Carrillo, L. Palacios. *On some topological Algebras of Holomorphic Functions*. Proc. of the ICTAA 1999. Tartu, Fin, 2001. p.p. 42-47] we studied the algebras $\mathcal{H}(D)$ and $\mathcal{H}(\overline{D})$ consisting of all holomorphic functions in the open unit disc D and the close unit disc \overline{D} on the complex plane, respectively. These algebras considered as algebras of sequences are denoted by A and B . Let A^α and B^α be the α -dual spaces of A and B , respectively; we have that $A^\alpha = B$ and $B^\alpha = A$. In this talk we consider a more general situation and we establish necessary and sufficient conditions under which the α -dual space of an algebra of sequences is a topological algebra too. We examine some pertinent examples.



Alan PATERSON (mmap@olemiss.edu), Department of Mathematics, University of Mississippi, MS 38655, USA, *Fourier algebras and Schur products. Tuesday, 4:20PM, Lower Auditorium*

ABSTRACT. The Fourier algebra $A(G)$ for a locally compact group, first investigated by P. Eymard, encodes, in Banach algebra form, information about group duality and amenability. In a different direction, V. Paulsen has investigated the cb norm on M_n as a Banach algebra acting on the usual M_n by Schur product. We will discuss how these two Banach algebras are (surprisingly) the same in kind. More precisely, both are examples of Fourier algebras for a locally compact groupoid. This illustrates how groupoid Fourier algebras provide a wide range of Banach algebras relevant to duality theory.



Daniil RIABKO (ryabko@math.nsc.ru) Department of Mechanics and Mathematics, Novosibirsk State University, Novosibirsk, Russia. *Functional representation of a Dedekind-complete Riesz space in a Boolean valued universe. Saturday, 5:10PM, Lower Auditorium*

ABSTRACT. Using a functional model of a Boolean-valued universe, the so-called polyverse, invented by A.E. Gutman and G.A. Losenkov, we introduce the basic notions of infinitesimal analysis within a Boolean-valued universe, thus enriching the synthesis of the two main branches of nonstandard analysis, infinitesimal and Boolean-valued. We apply the results obtained to the theory of Riesz spaces. In particular, the following fact is proven: The inverse of the standard-part function for real numbers in a Boolean-valued universe is an isomorphism between an arbitrary uniformly-complete Riesz space (K -space) and the set Riesz space of reals in the corresponding Boolean-valued universe. This function is also an isomorphism between a Dedekind-complete Riesz space with the strong unit and the set of limited numbers in a Boolean-valued universe. Moreover, using the results obtained we construct a new functional representation for K -spaces, ideals, and order-dense ideals of K -spaces and propose analogs of the basic notions of the theory of Riesz spaces in this new representations. This is a joint work with Alexander Gutman.



David ROBBINS (david.robbins@trincoll.edu), Department of Mathematics, Trinity College, Hartford, CT 06106, USA, *A note on the space of weakly continuous sections of a Banach bundle. Saturday, 4:45PM, Lower Auditorium*

ABSTRACT. Let $\pi : \mathcal{E} \rightarrow X$ be a real Banach bundle with continuous norm, where X is a compact Hausdorff space and the section space of the bundle admits sufficiently many $C(X)$ -homomorphisms into $C(X)$. We study the space of weakly continuous sections of this bundle, considered both as a Banach space and as the space of sections of a bundle of locally convex topological vector spaces. (This is joint work with A. Koptev of the Sobolev Institute, Novosibirsk.)



Richard ROCHBERG (rr@math.wustl.edu), Department of Mathematics, Washington University, St Louis, MO 63130, USA, *Hankel Forms on the Dirichlet Space and Related Operators. Wednesday, 9:00AM, Lower Auditorium*

ABSTRACT. Recently Mazya and Verbitsky gave a solution to the following problem. For which complex functions b is it true that there is an estimate of the form $\left| \int_{\mathbb{R}^n} |u|^2 b \right| \leq c \int_{\mathbb{R}^n} |\nabla u|^2$? (*)

The case $n = 1$ is elementary and the case $b \geq 0$ is classical; but the general case involves substantial difficulties. More recently Aleksandrov, Janson, Peller, and I studied the Schatten ideal behavior of the linear operator associated with (*). For those questions even the case $n = 1$ presents difficulties and we were only able to obtain complete results for $p > 1$.

The estimate (*) is analogous to a boundedness statement for Hankel bilinear forms of the Dirichlet space of holomorphic functions on the disk. The discrete model of that situation involves Hardy-type operators on trees, and a number of people have studied boundedness criteria and Schatten ideal behavior of those operators. I will discuss various approaches, results, and questions related to these themes.



Volker RUNDE (vrunde@ualberta.ca), Department of Mathematical and Statistical Sciences, University of Alberta, Edmonton, Alberta T6G 2G1, Canada, *Abstract harmonic analysis, homological algebra, and operator spaces. Saturday, 1:30PM, Lower Auditorium*

ABSTRACT. In 1972, B. E. Johnson proved that a locally compact group G is amenable if and only if certain Hochschild cohomology groups of its convolution algebra $L^1(G)$ vanish. Similarly, G is compact if and only if $L^1(G)$ is biprojective: In each case, a classical property of G corresponds to

a cohomological property of $L^1(G)$. Starting with the work of Z.-J. Ruan in 1995, it has become apparent that in the non-commutative setting, i.e. when dealing with the Fourier algebra $A(G)$ or the Fourier–Stieltjes algebra $B(G)$, the canonical operator space structure of the algebras under consideration has to be taken into account: In analogy with Johnson’s result, Ruan characterized the amenable locally compact groups G through the vanishing of certain cohomology groups of $A(G)$. This talk is intended as a survey of historical developments and current open problems.



John RYAN (ryan@uark.edu), Department of Mathematics, University of Arkansas, Fayetteville, AR 72701, USA, *Large Function Theory of Some Conformally Flat Manifolds.*

Wednesday, 3:30PM, Lower Auditorium

ABSTRACT. We shall introduce function theory associated to Dirac and Laplace operators over special examples of conformally flat manifolds. They include spheres, cylinders and the n -torus. Hardy spaces associated to Lipschitz surfaces and aspects of Calderon-Zygmund theory will be presented in this setting following classical ideas developed in the euclidean setting by Li, McIntosh, Mitrea and Semmes amongst others.



Elias SALEEBY (esaleeby@yahoo.com), Department of Mathematical Sciences, University of Arkansas, Fayetteville, AR 72701, USA *Entire solutions of certain first order pde’s.*

Saturday, 4:20PM, Lower Auditorium

ABSTRACT. In this talk we characterize entire solutions of equations of the form $u_{z_i} = f(u)$, f meromorphic, and systems of these equations. Moreover, we discuss complex-analytic solutions to Fermat type partial differential equations.

This talk is based on joint work with Bao Qin Li.



Peter SEMRL (peter.semrl@mf.uni-lj.si), Department of Mathematics, University of Ljubljana, Jadranska 19, SI-1000 Ljubljana, Slovenia *Approximate Isometries.*

Friday, 1:30PM, Lower Auditorium

ABSTRACT. Let X and Y be real Banach spaces. A map $f : X \rightarrow Y$ is called an approximate isometry if

$$\| \|f(x) - f(y)\| - \|x - y\| \| \leq \varepsilon, \quad x, y \in X,$$

for some $\varepsilon \geq 0$. Some recent results on such maps will be presented.



David SHERMAN (dasherma@math.uiuc.edu), Dept. of Mathematics, Univ. of Illinois at Urbana-Champaign, Urbana, IL 61801-2975, USA, *Noncommutative L^p Modules.*

Friday, 5:35PM, Upper Auditorium

ABSTRACT. A von Neumann algebra \mathcal{M} is commonly considered a non-commutative L^∞ space; to it one can associate a noncommutative L^p space. It is well-known, but underappreciated, that $L^p(\mathcal{M})$ has good manners as a module. In this talk I will explain how to use $L^p(\mathcal{M})$ to generate a full L^p representation theory. There are many directions to go. In addition to explaining the basic definitions, I will at least (i) discuss sets of intertwiners, generalizing the known description of the commutant for $p \geq 1$; (ii) give an abstract characterization using an inner product; (iii) point out similarities and differences with Hilbert space representations ($p = 2$) and Hilbert

C^* -modules ($p = \infty$). Intervening moments may be spent on examples and a surprisingly restrictive bimodule theory. This is joint work with Marius Junge.



Karen SHUMAN (kshuman@math.uiuc.edu), Department of Mathematics, University of Illinois Urbana-Champaign, Urbana, IL 61801, USA, *Cyclic functions in $L^p(\mathbb{R})$, $1 \leq p < \infty$.*

Friday, 5:10PM, Upper Auditorium

ABSTRACT. Functions whose translates span $L^p(\mathbb{R})$ are called L^p -cyclic functions. For a fixed $p \in [1, \infty)$, we construct Schwartz-class functions which are L^r -cyclic for $r > p$ and not L^r -cyclic for $r \leq p$. We then construct Schwartz-class functions which are L^r -cyclic for $r \geq p$ and not L^r -cyclic for $r < p$. The constructions differ for $p \in (1, 2)$ and $p > 2$. Joint work with Joseph Rosenblatt.



Stuart Jay SIDNEY (sidney@math.uconn.edu), Dept. of Math., Univ. of Connecticut, Storrs, CT 06269, USA, *Uniform algebras generated by unimodular functions.* *Thursday, 4:20PM, Lower Auditorium*

ABSTRACT. To a uniform algebra A on a compact Hausdorff space X we associate the algebra \tilde{A} of sequences $\tilde{f} = \{f_n\}$ with $f_n \in A$ and $\|\tilde{f}\| = \sup_n \|f_n\| < \infty$. \tilde{A} may be regarded as an algebra of bounded continuous functions on $\mathbf{N} \times X$, and so as a (possibly non-separating) subalgebra of $C(\tilde{X})$, where $\tilde{X} = \beta(\mathbf{N} \times X)$ is the Stone – Čech compactification of $\mathbf{N} \times X$. The interplay between properties of A and of \tilde{A} is a subject of great interest. If X is the spectrum of A , the density of $\mathbf{N} \times X$ in the spectrum of \tilde{A} is equivalent to a certain uniform corona theorem for A , if A were a polydisc algebra, it would give the corona theorem for A (facts which were known in the late sixties). We show that if (like a polydisc algebra) A is generated by unimodular functions on its Šilov boundary, then so is \tilde{A} ; we make further observations on the connection with corona problems.



Gleb SIROTKIN (syrotkin@math.iupui.edu), Department of Mathematics, Indiana University - Purdue University at Indianapolis, Indianapolis, IN 46202, USA *Daugavet property and vector-valued L_p -spaces.*

Friday, 3:30PM, Upper Auditorium

ABSTRACT. A Banach space X has the *Daugavet property* for a class \mathcal{M} of bounded operators if $\|I + T\| = 1 + \|T\|$, for all $T \in \mathcal{M}$. If the identity is true only for $T \in \mathcal{M}$ with $\|T\| \in \sigma(T)$, the space X has the *anti-Daugavet property* for \mathcal{M} . It is known that if X has the Daugavet property for all rank-1 operators, then X has the Daugavet property for all weakly compact operators. We have shown that for the anti-Daugavet property a similar fact is not true. The proof depends on the possibility to extend some geometric properties from a Banach space X to the Lebesgue-Bochner space $L_p(\mu, X)$.

Nevertheless a significant part of the implication in the question remains true, namely, the anti-Daugavet property for rank-1 operators implies the anti-Daugavet property for compact operators.



Thomas V. TONEV (ma_tt@selway.umt.edu), Department of Mathematical Sciences, University of Montana, Missoula, MT 59812-1032, USA, *Analytic functions on compact groups and applications to almost periodic functions.* *Tuesday, 1:30PM, Lower Auditorium*

ABSTRACT. A continuous function f on the real line \mathbf{R} is *almost periodic* if it can be approximated uniformly on \mathbf{R} by *exponential polynomials* $\sum_{k=1}^n a_k e^{is_k x}$, where $a_k \in \mathbf{C}$, and $s_k \in \mathbf{R}$. Almost periodic functions were introduced by H. Bohr in the early 1920s in the course of his investigation on Dirichlet series of analytic functions. An unconventional approach to their study, due to Arens and Singer, is to include them in suitable uniform algebras. Let S be an additive subsemigroup of $[0, \infty)$, and $\Gamma = S - S$ is the

subgroup of \mathbf{R} generated by S . Denote by $AP_S(\mathbf{R})$ the space of almost periodic functions approximable on \mathbf{R} by exponential polynomials with $s_k \in S$. The space $AP_S(\mathbf{R})$ is an uniform algebra isometrically isomorphic to the algebra A_S of analytic functions on a compact group with spectrum in S . We find explicit conditions on S under which every linear multiplicative functional of A_S can be extended as a linear multiplicative functional on a larger algebra of the same type A_Σ , with $S \subset \Sigma \subset [0, \infty)$.



Armando VILLENA (avillena@ugr.es) Department of Mathematical Analysis, University of Granada 18071 Granada, Spain. *Continuity of operators intertwining with convolution operators.*

Thursday, 3:55PM, Upper Auditorium

ABSTRACT. Let G be a locally compact abelian group, let μ be a complex-valued Borel measure on G , and let T_μ be the corresponding convolution operator on $L^1(G)$. Let X be a Banach space and let S be a continuous linear operator on X . Then we show that every linear operator $\Phi : X \rightarrow L^1(G)$ such that $\Phi S = T_\mu \Phi$ is continuous if and only if the pair (S, T_μ) has not any critical eigenvalue.



Guido WEISS (guido@math.wustl.edu), Department of Mathematics, Washington University, St. Louis, MO 63130, USA, *A unified approach for characterizing reproducing systems in L^2 .*

Saturday, 9:00AM, Lower Auditorium

ABSTRACT. Many systems of functions obtained by letting various Dilations, Translations and Modulation operators act on a single or finite family of functions in L^2 have been introduced that form an orthonormal basis (or a more general spanning set) for L^2 . These include the Affine systems (wavelets), the Gabor systems and many other similar spanning sets. We shall describe a general approach that characterizes all these systems.

Marshall WHITTLESEY (mwhittle@csusm.edu), Department of Mathematics, California State University San Marcos, San Marcos, CA 92096, USA, *Nonlinear Riemann-Hilbert problems and control theory.*

Wednesday, 5:35PM, Lower Auditorium

ABSTRACT. We discuss some results concerning the ability to find analytic functions whose boundary values land in specified sets, and an application to a problem of H^∞ control.



Jan WIEGERINCK (janwieg@wins.uva.nl), Institute of Mathematics, University of Amsterdam, 1018 TV Amsterdam, Netherlands, *The boundary of the unit ball of H^1 .* *Friday, 11:30AM, Lower Auditorium*

ABSTRACT. Let \mathbb{D} be the unit disc in \mathbb{C} . The Hardy space $H^1(\mathbb{D})$ can be defined as the closure of the holomorphic polynomials in the L^1 -norm on the boundary of \mathbb{D} . Extreme, exposed and strongly exposed boundary points of the unit ball in $H^1(\mathbb{D})$ have been studied extensively. In particular, good characterizations of extreme and strongly exposed points are available. We will review some of these and then pass to $H^1(\mathbb{B}_2)$, the Hardy space of the unit ball in \mathbb{C}^2 . Here there are only scattered results. However, the subspace of $H^1(\mathbb{B}_2)$ consisting of functions that depend only on, say, the first variable, is easier to handle. It can be identified with the Bergman space $A^1(\mathbb{D})$ that

consist of holomorphic functions that are in $L^1(\mathbb{D})$. While it is easy to see that all boundary points of the ball in $A^1(\mathbb{D})$ are exposed, not all of them are strongly exposed. We will give an example of an exposed point that is not strongly exposed. The main result is that a large class of strongly exposed points is identified. This class includes the holomorphic polynomials of norm 1. This is joint work with Paul Beneker.



Ngai-Ching WONG (wong@math.nsysu.edu.tw), Department of Applied Mathematics, National Sun Yat-sen University, Kaohsiung, 80424 Taiwan. *Disjointness preserving shifts on continuous function spaces.*

Saturday, 2:20PM, Lower Auditorium

ABSTRACT. We study disjointness preserving (quasi-) n -shift operators on $C_0(X)$, where X is locally compact and Hausdorff. When $C_0(X)$ admits such a quasi- n -shift T , there is a countable subset of $X_\infty = X \cup \{\infty\}$ equipped with a tree-like structure, called vp-tree, with exactly n joints such that the action of T on $C_0(X)$ can be implemented as a shift on the vp-tree. If T is even an n -shift, then the vp-tree is dense in X and thus X is separable. By analyzing the structure of the vp-tree, we show that every (quasi-) n -shift on

$C_0(X)$ can always be written as a product of n (quasi-)shifts. Although it is not the case for general $C_0(X)$ as shown by our counter examples, we can do so after dilation.



Zhijian WU (zwu@gp.as.ua.edu), Department of Mathematics, University of Alabama, College of Arts and Sciences, Tuscaloosa, AL 35487-0350, USA, *Morrey space and applications.*

Wednesday, 5:10PM, Lower Auditorium

ABSTRACT. We characterize functions in Morrey space by p -Carleson measures. We then reveal a simple relation between Q space and Morrey space, that is Q space can be viewed as a fractional integration of the Morrey space. Therefore many results for Morrey space can be translated onto Q space. For example, we show that Q space is a dual space by identifying its predual.



Ruhan ZHAO (zhaor@math.uc.edu) Department of Mathematical Sciences, University of Cincinnati, Cincinnati, OH 45221-0025, USA, *Pointwise multipliers from weighted Bergman spaces and Hardy spaces to weighted Bergman spaces.*

Friday, 5:10PM, Lower Auditorium

ABSTRACT. Pointwise multipliers from weighted Bergman spaces and Hardy spaces to weighted Bergman spaces are characterized by using Bloch type spaces, BMOA type spaces, weighted Bergman spaces and tent spaces.



Beate ZIMMER (bzimmer@muw.edu), Division of Science and Mathematics, Mississippi University for Women, Columbus, MS 39701, USA, *Isometries of C^* -algebras.* *Thursday, 3:30PM, Upper Auditorium*

ABSTRACT. We use Nonstandard Analysis to study isometries between C^* -algebras. Previously we used nonstandard peak functions to study isometries between $C(K)$ -spaces. This talk presents some first results on generalizing these results to C^* -algebras. Kadison's theorem about isometries of operator algebras dates back to 1951, but a different approach may give some new insights.