Workshop on Banach spaces and Banach lattices

Book of abstracts

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Contents

Mini-courses

Transitivity and Ramsey properties of L_p spaces

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We shall study the dynamics of the group of linear isometries on L_p-spaces, in relation to classical transitivity properties of norms on Banach spaces. We shall define the central notion of a Fraïssè Banach space, showing that $L_p(0,1)$, $p \neq 4, 6, 8, \ldots$ are separable examples of this property: in particular, we shall study the canonical actions of the isometry group of $L_p(0,1)$ on the spaces of δ-isometric embeddings of finite dimensional subspaces of $L_p(0,1)$ into itself, and show that for $p \neq 4, 6, 8, \ldots$ they are ϵ-transitive provided that δ is small enough. This extends the classical equimeasurability principle of Plotkin and Rudin. We shall relate these results to a Ramsey property of the classes ℓ_p^n, and time allowing, we shall discuss the conjecture that $L_p(0,1), p \neq 4, 6, 8, \ldots$ and the Gurarij are the only separable Fraïssè spaces. Based on a joint work with J. Lopez-Abad, B. Mbombo and S. Todorcevic.

Topological properties of dominated and pointwise convergence of sequences of measurable functions

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Let $L^0(\mu)$ be the space of all measurable functions on a measure space (Ω, Σ, μ). A Banach function space on (Ω, Σ, μ) is a subspace X of $L^0(\mu)$ endowed with a complete norm $\|\cdot\|$ so that if $|f| \leq |g|$ and $g \in X$, then $f \in X$ and $\|f\| \leq \|g\|$. The general theme of these talks is to explore the extent to which dominated and pointwise convergence in X is related to certain locally convex topologies on X.

Let A be a subset of X. We call the set

$$\overline{A}^o = \{f : f = \lim f_n \text{ a.e., where } (f_n) \subseteq A \text{ and } |f_n| \leq g \text{ for some } g \in X\}$$

the order closure of A. The set A is order closed if $\overline{A}^o = A$. In general, the order closure of a set may be far from being order closed. For example, the following questions arose in mathematical economics and mathematical finance.

1. For which X is it true that $\overline{Y}^o$ is order closed for every sublattice of X?

2. The associated space X' of X consists of all $g \in L^0(\mu)$ so that $\int |fg|\, d\mu < \infty$ for all $f \in X$. (In Banach lattice terms, it is the order continuous dual $X_n^\sim$.) For which X is it true that $\overline{C}^o = \overline{C}^{\sigma(X,X')}$ for all (bounded) convex sets C in X?

3. For which X is it true that every order closed (bounded) convex set in X is $\sigma(X, X')$-closed?

Similar questions can be considered for pointwise convergence in place of dominated convergence. In the case of a finite measure space (Ω, Σ, μ), pointwise convergence is of course related to the topology of convergence in measure. However, this topology is not locally convex. This leads to another question:

(d) Determine the convex subsets C of $L^0(\mu)$ so that the topology of convergence in measure on C is locally convex.

Supports and approximation properties in Lipschitz-free spaces

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To every metric space M it is possible to assign a free Banach space $\mathcal{F}(M)$ generated by M in such a way that Lipschitz maps between metric spaces translate to linear operators between the corresponding free Banach spaces. We call the space $\mathcal{F}(M)$ the *Lipschitz-free space* over M, or the *free space* in short (also known as the Arens-Eells or transportation cost space). The universal property of free spaces, in particular, allows applications of linear theory to the study of non-linear geometry of Banach spaces. For instance, using free spaces Godefroy and Kalton proved that if a separable Banach space Y is isometric to a subset of a Banach space X, then Y is already linearly isometric to a subspace of X. Therefore, free spaces have become a subject of active research efforts.

In this mini-course, we will first recall the basics about free spaces and then we will focus on some recent development in this field.

Supports. We will introduce a new notion of support applicable to all elements of free spaces over complete metric spaces. Its definition is very natural, however, the proof that it is really meaningful is rather nontrivial. It follows from the particular algebraic structure of the spaces of Lipschitz functions (the isometric duals of the free spaces) described by Weaver. We will sketch the proof and show some basic properties of supports. Then we will present their application to the study of extreme points of free spaces. This part of the course is based on joint work with R. Aliaga.

Approximation properties. Godefroy and Kalton showed that the bounded approximation property (BAP) of a Banach space is equivalent to BAP of its free space, hence stable under Lipschitz isomorphisms. We will demonstrate certain techniques for verifying approximation properties, decompositions, and bases of free spaces and provide examples. We will discuss the relation to the existence of linear extension operators on spaces of Lipschitz functions. This part of the talk is based on collaborations with P. Hàjek, G. Lancien, and R. Smith.

Bibasic sequences in Banach lattices

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University of Alberta

This is a joint project with M. Taylor. Given a Schauder basic sequence (x_k) in a Banach lattice, we say that (x_k) is bibasic if the expansion of every vector in $[x_k]$ converges not only in norm but also in order. The concept of a bibasic sequence was introduced by Gumenchuk et al in 2015. We prove that, in this definition, convergence in order may be replaced with uniform convergence, with order boundedness of the partial sums, or with norm boundedness of finite suprema of the partial sums. We prove similar results for Schauder decompositions. We characterize bibasic sequences and bidecompositions in terms of a *bibasis inequality*. We show that they are independent of the ambient space and are stable under small perturbations and under sequentially uniformly continuous norm isomorphic embeddings. We consider several special kinds of bibasic sequences, including *permutable* sequences, i.e., sequences for which every permutation is bibasic, and *absolute* sequences, i.e., sequences where expansions remain convergent after we replace every term with its modulus. We provide several equivalent characterizations of absolute sequences. We also consider bibasic sequences with unique order expansions and uo-bibasic sequences.

Plenary lectures

A map for injectivity: cool sights, unmissable spots

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Injectivity properties of Banach spaces is somewhat of a conundrum: injective spaces should be $\mathbb{R}$, say ℓ_∞ or something similar, but they are not; definitions should be simple —operators can be extended anywhere— but they are not; and injective spaces should be "universal" objects (injective objects in a category are universal, aren't they?) but ... who knows?. All that happens because Banach space theory is a soft place where many different approaches interwine. Let's do then what any judicious person would do: a map. In it we will mark:

- Locally injective spaces. After all, local theory of Banach spaces exists.
- Size issues. Well, if separable Banach spaces form a natural working subcategory, separable injectivity should be considered too.
- Categorical and homological arguments must be involved in the discussion.
- Geometrical arguments cannot be ignored too, and possible parameters measuring injectivity properties neither.
- Examples and counterexamples in the real world.

With that in hand, we are ready to enter the territory (which is not the map) and think about properties of injective spaces.

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Ordered Banach spaces: Embeddings and disjointness preserving operators

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In Banach lattices, disjointness preserving operators are well-investigated. In ordered Banach spaces, disjointness and related notions are introduced as well. The analysis of these concepts revolves around embeddings of ordered vector spaces into vector lattice covers. Pre-Riesz spaces allow such an embedding, and every ordered Banach space with a closed and generating cone is pre-Riesz. We generalize some well-known results from the theory of Banach lattices to ordered Banach spaces, where we deal with properties of inverses of disjointness preserving operators as well as of generators of disjointness preserving C_0-semigroups. As a tool we need extensions of norms on pre-Riesz spaces to appropriate norms on vector lattice covers. We discuss similarities and differences between the settings of Banach lattices and ordered Banach spaces and outline open questions.

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Grothendieck inequalities

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I will review some results concerning Grothendieck inequalities for $C(K)$-spaces, C*-algebras and JB* triples, including the recent solution of the Barton-Friedman conjecture. Related results on the structure of the strong*-topology will be addressed, too. The talk is based on a recent joint work with Jan Hamhalter, Antonio M. Peralta and Hermann Pfitzned.

Fredholm operators on interpolation spaces

Mieczysław Mastyło (mastylo@amu.edu.pl)
Adam Mickiewicz University in Poznań

We will present novel results on the stability of Fredholm property of operators on Banach spaces generated by interpolation methods. We also will discuss the stability of isomorphisms on scales of interpolation spaces which includes the real and complex method spaces. A by-product of our results is that interpolated isomorphisms satisfy uniqueness-of-inverses. The talk is based on the joint works with I. Asekritova and N. Kruglyak.

New constructions of closed ideals in $L(L_p)$, $1 \leq p \neq 2 < \infty$

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I intend to present two recent results. The first, joint with Johnson and Pisier, is the existence of a continuum of closed ideals in $L(L_1)$. The second, joint with Johnson, is the existence of $2^{2^{\aleph_0}}$ closed ideals in $L(L_p)$, $1 < p \neq 2 < \infty$.

On the bi-Lipschitz geometry of lamplighter graphs

Andras Zsak (a.zsak@dpmms.cam.ac.uk)
University of Cambridge

We introduce lamplighter graphs which are natural generalizations of lamplighter groups. We study how properties of a graph are reflected in the metric behaviour of the lamplighter graph over it. This analysis provides new metric characterizations of superreflexivity. We prove that lamplighter graphs over trees bi-Lipschitzly embed into Hamming cubes, and that Hamming cubes embed into lamplighter graphs over graphs containing Lipschitz copies of cliques. This answers positively the question whether the notion of trivial Bourgain-Milman-Wolfson type admits, for arbitrary metric spaces, a characterization in terms of a sequence of graphs with uniformly bounded degree. This talk is based on joint work with Florent Baudier, Pavlos Motakis and Thomas Schlumprecht.

Contributions

Measures, supports, and extremality in Lipschitz-free spaces

Ramón José Aliaga Varea (raalva@upvnet.upv.es)
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We present recent developments on the geometry of Lipschitz-free Banach spaces that lead to a natural definition of support for elements of such spaces. This allows us to consider an element of a free spaces as a kind of generalized measure on the underlying metric spaces and to analyze to which extent this representation is valid. Some applications of these techniques to the study of the extremal structure of free spaces are also given. This is a work in progress with E. Pernecká, C. Petitjean and A. Procházka.

Orthogonally additive polynomials on non-commutative L^p-spaces

María Luisa Castillo Godoy (mgodoy@ugr.es)
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Let $\mathcal{M}$ be a von Neumann algebra with a normal semifinite faithful trace τ. We prove that every continuous m-homogeneous polynomial P from $L^p(\mathcal{M},\tau)$, with $0 < p < \infty$, into each topological linear space X with the property that $P(x+y) = P(x)+P(y)$ whenever x and y are mutually orthogonal positive elements of $L^p(\mathcal{M},\tau)$ can be represented in the form $P(x) = \Phi(x^m)$ $(x \in L^p(\mathcal{M},\tau))$ for some continuous linear map Φ from $L^{p/m}(\mathcal{M},\tau)$ into X.

This result is an extension of the result published by Sundaresan in 1991, which gave a representation for polynomials on $L^p[0,1]$ or ℓ^p, with $1 \leq p < \infty$. Our result is much more general since we not only ensure representation in non-commutative L^p-spaces, but we also contemplate the cases in which the spaces are not Banach spaces.

This is a joint work with J. Alaminos and A. R. Villena.

Ando-Choi-Effros liftings for regular maps between Banach lattices

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The classical Ando-Choi-Effros theorem gives conditions under which a bounded linear operator taking values in a quotient space can be lifted through the quotient map. Well-known applications of this theorem include a variety of extension results, and more recently it has played a recurrent role in the study of approximation properties for Lipschitz-free spaces. In this talk we present an Ando-Choi-Effros lifting theorem for regular maps between Banach lattices.

On the disjoint structure of twisted sums

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In this talk we study some aspects of the structure of twisted sums. Recall that a twisted sum of two Banach spaces Y, Z is a quasi-Banach space X which has a closed subspace isomorphic to Y such that the quotient X/Y is isomorphic to Z. Although a twisted sums of Köthe spaces is not necessarily a Köthe space, those which are obtained by the complex interpolation method are equipped in a natural way with an L_∞ - module structure. In this case we study disjoint versions of basic notions of the theory of twisted sums. We also consider some properties in the direction of local theory. The talk is based on a joint work with J. Castillo, V. Ferenczi and Y. Moreno.

Inversion and extension of the finite Hilbert transform

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For the finite Hilbert transform T on $[-1, 1]$ we consider two problems:

(a) Finding inversion formulae in the case when T acts on rearrangement invariant spaces on $[-1, 1]$ where T is continuous. This problem was studied by Tricomi and others on the L_p spaces, $1 < p < \infty$.

(b) Studying the possibility of extending $T\colon X \to X$ to a larger domain, in the case when X is any rearrangement invariant space where T is continuous. This problem was studied by Okada, Ricker and Sanchez-Perez for the L_p spaces with $1 < p < \infty$ and $p \neq 2$.

Joint work with W.J. Ricker (Germany) and S. Okada (Australia).

Factorization of Φ-abstract p-summing linear operators

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ENS de Bousaada and Laboratoire d'Analyse Fonctionnelle et Géométrie des Espaces, University of M'sila

We introduce a general family of summability properties for linear mappings defined by means of a homogeneous mapping. That are characterized by means of domination inequalities that always lead to factorization theorems. That includes the classes of absolutely p-summing operators, (p, σ)-continuous operators.

Dense subspaces which admit smooth norms

Sheldon Dantas (gildashe@fel.cvut.cz)

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In this talk, we present some results concerning the existence of smooth norms on dense subspaces. This was motivated by a question made by Antonio Guirao, Vicente Montesinos, and Václav Zizler whether the normed space $\mathcal{F}$ of all finitely supported vectors in $\ell_1(\Gamma)$, endowed with the ℓ_1-norm, admits a Frèchet smooth norm, where Γ is an uncountable set. This is a joint work with Petr Hàjek and Tommaso Russo.

The Bishop-Phelps-Bollobás for operators

José Luis Dávila Albarrán (jolu6.0@gmail.com)
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In 1961 Bishop and Phelps showed that for any Banach space the subset of norm attaining functionals is dense in the topological dual. Bollobás in 1970 showed a *quantitative* version of that result. Nowadays, this theorem is known as the Bishop-Phelps- Bollobás theorem. Recently (2008), was introduced the Bishop-Phelps-Bollobás property for operators between Banach spaces. In this talk we will present some recent results about the BPBp. This a joint work with M. Acosta.

Banach spaces containing many complemented subspaces

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A Banach space X is subprojective if every infinite dimensional (closed) subspace of X contains an infinite dimensional subspace complemented in X. The space X is superprojective if every infinite codimensional (closed) subspace of X is contained in an infinite codimensional subspace complemented in X. We present new examples of subprojective and superprojective Banach spaces, and describe some open problems.

Metric functionals on Banach spaces

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Let (X, d) be a metric space. For an arbitrary point $x_0 \in X$ let $\mathrm{Lip}^1_{x_0}(X)$ denote the set of all 1-Lipschitz mappings $\mathbf{h} : X \to \mathbb{R}$ vanishing at x_0. If we endow $\mathrm{Lip}^1_{x_0}(X)$ with the topology of pointwise convergence, then the mapping $x \mapsto \mathbf{h}_x(\cdot) = d(\cdot, x) - d(x_0, x)$ is a continuous injection of X into $\mathrm{Lip}^1_{x_0}(X)$ and its image has compact closure. A *metric functional* on X is an element of the pointwise closure of the set $\{\mathbf{h}_x \mid x \in X\}$. The set of all metric functionals on X is known as the *metric compactification* of X.

Metric functionals are fundamental objects in Metric Geometry. They play a role analogous to that of continuous linear functionals in Functional Analysis. Dynamics of isometries and semicontractions of metric spaces can be better understood through the use of metric functionals. However, characterizing metric functionals on general metric spaces is a non-trivial task.

Despite the fact that Banach spaces have both metric and linear structure, metric functionals incorporate important non-linear features into the geometry of Banach spaces. I will show explicit representation formulas for all metric functionals on some classical Banach spaces.

Injective dual Banach spaces and operator ideals

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We give characterizations of Banach spaces with λ-injective biduals in terms of operators with an integral representation. These results may be thought of as a certain refinement of Lindenstrauss‘ extension theorems from his 1964 memoir. As a particular consequence, we give a negative answer to a question raised in 2003 by M. Zippin on extensions of $C(K)$-valued operators. We also obtain dual results characterizing Banach spaces with λ-injective duals in terms of $L_1(\mu)$-factorization of operators. This is a joint work with Raffaella Cilia.

Surjective homomorphisms of algebras of operators on Banach spaces

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A classical result of Eidelheit asserts that if X and Y are Banach spaces then they are isomorphic if and only if their algebras of operators $\mathcal{B}(X)$ and $\mathcal{B}(Y)$ are isomorphic as Banach algebras, in the sense that there is a continuous bijective algebra homomorphism $\psi : \mathcal{B}(X) \to \mathcal{B}(Y)$. It is natural to ask whether for some class of Banach spaces X this theorem can be strengthened in the following sense: If Y is a non-zero Banach space and $\psi : \mathcal{B}(X) \to \mathcal{B}(Y)$ is a surjective algebra homomorphism, is ψ automatically injective?

It is easy to see that for a "very nice" class Banach spaces, such as c_0 and ℓ_p, where $1 \leq p < \infty$, the answer is positive. In our talk we shall present methods which allow us to extend the range of positive examples, including ℓ_∞ and Hilbert spaces of arbitrary density character. More exotic examples include $(\oplus_{n=1}^{\infty} \ell_2^n)_{c_0}$ and $(\oplus_{n=1}^{\infty} \ell_2^n)_{\ell_1}$ and the arbitrarily distortable Banach space **S** constructed by Schlumprecht. Time permitting we present a permanence-type result too.

In the other direction, with the aid of a result of Kania–Koszmider–Laustsen [2] we will show that for any separable, reflexive Banach space X there is a Banach

space Y_X and a surjective algebra homomorphism $\psi : \mathcal{B}(Y_X) \to \mathcal{B}(X)$ which is not injective.

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An update on the classification program of (maximal) ideals of algebras of operators on Banach spaces: the cases of Tsirelson and Schreier spaces.

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Czech Academy of Sciences in Prague

Recently, a significant progress in the program of classification of (maximal/closed) ideals of the algebras of bounded operators on various classical Banach spaces, such as $\ell_p \oplus \ell_q$ $(1 \leqslant p < q < \infty)$ [Schlumprecht–Zsák] or L_1, L_∞ [Johnson–Pisier–Schechtman], has been obtained. The purpose of this talk is to report on further progress concerning the Tsirelson space as well as (higher-order) Schreier spaces and the surprisingly intricate structure of the lattices of closed operators of the algebras of bounded operators acting thereon. This is joint work with Beanland and Laustsen.

Algebra of convolution type operators with continuous data on Banach function spaces

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We show that if the Hardy-Littlewood maximal operator is bounded on a reflexive Banach function space $X(\mathbb{R})$ and on its associate space $X`(\mathbb{R})$, then the space $X(\mathbb{R})$ has an unconditional wavelet basis. As a consequence of the existence of a Schauder basis in $X(\mathbb{R})$, we prove that the ideal of compact operators $\mathcal{K}(X(\mathbb{R}))$ on the space $X(\mathbb{R})$ is contained in the Banach algebra generated by all operators of multiplication aI by functions $a \in C(\dot{\mathbb{R}})$, where $\dot{\mathbb{R}} = \mathbb{R} \cup \{\infty\}$, and by all Fourier convolution operators $W^0(b)$ with symbols $b \in C_X(\dot{\mathbb{R}})$, the Fourier multiplier analogue of $C(\dot{\mathbb{R}})$.

Approximation properties in Lipschitz-free spaces over groups

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We study approximation properties in Lipschitz-free spaces over topological groups equipped with invariant metrics which are compatible with the topology. In particular, we show that the Lipschitz-free spaces over a class of compact groups, which includes finite dimensional unitary groups and their closed subgroups, satisfy the metric approximation property.

A characterization of random variables

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Given a probability space $(\Omega, \mathscr{F}, \mu)$, it is known that the vector lattice $L^0(\mu)$ of equivalence classes of random variables $f : \Omega \to \mathbf{R}$ is universally complete and the constant function $\mathbf{1}$ is a weak order unit. We provide necessary and sufficient conditions for the converse to hold true.

Factorization of operators on Banach (function) spaces

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In this talk I will discuss an abstract factorization principle in spirit of the Kwapieǹ–Maurey factorization theorem. For Banach spaces X and Y such that X has type 2 and Y has cotype 2, this can be used to factorize certain families of bounded operators $\Gamma_1 \subseteq \mathcal{L}(X,Y)$ and $\Gamma_2 \subseteq \mathcal{L}(Y)$ through a Hilbert space, generalizing the result of Kwapieǹ and Maurey. Moreover in the special case where X is a Banach function space on a σ-finite measure space (S,Σ,μ), the abstract factorization principle can be made more explicit. This yields the factorization of certain families of operators $\Gamma \subseteq \mathcal{L}(X)$ through $L^2(S, w\,\mathrm{d}\mu)$, where $w : S \to [0,\infty)$ is a density function. I will discuss an application on the geometry of Banach function spaces. It is a deep result by Bourgain [1] and Rubio de Francia [3] that for a Banach function space X the unconditionality of martingale difference sequences in $L^p(\Omega;X)$ (the so-called UMD property of X) is equivalent to the boundedness of the lattice Hardy–Littlewood maximal operator on both $L^p(\mathbb{R}^d;X)$ and $L^p(\mathbb{R}^d;X^*)$. Using the discussed factorization theorem we can give a simplified proof of this result and in addition obtain quantitative estimates between the involved constants. This talk is based on joint work with Nigel Kalton and Lutz Weis.

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Products of compact lines

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This is a joint work with Grzegorz Plebanek. The classical Peano curve demonstrates that the unit interval, a metrizable compact line, may be continuously mapped onto its square. This cannot happen for compact lines that are not metrizable: Treybig and Ward proved that if a product of two infinite compact spaces is a continuous image of a compact line then such a product is necessarily metrizable. In 1970 Mardesic conjectured that if a product of d compact lines can be mapped onto a product of d+s infinite compact spaces $K_1, K_2, \ldots, K_{d+s}$ with $s \geq 1$, then there are at least $s+1$ metrizable factors K_j. Using a new kind of dimension of compacta, combinatorial in nature, we are able to solve Mardesic's Conjecture. Transferring this new concept of dimension to the context of Boolean algebras allows us to solve another problem of L. Baur and H. Heindorf from 1997.

If time permits, we will discuss some open problems on Banach Space Theory where this concept of dimension might throw some light.

Fundamental solutions for fractional differential equations inolving fractional powers of finite differences operators

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In this talk we give representation results for solutions of time-fractional differential equations which involve fractional powers of finite difference operators. We consider finite difference operators of first and second order which includes the discrete Laplacian. The linear and algebraic structure (in particular factorization properties) and C_0-semigroups and cosine functions generated by these operators are presented. As consequences, we show new asymptotic formulae for Bessel functions. This is jointly work with Jorge González from Universidad de Santiago de Chile.

Fragmentation, amalgamation and twisted hilbert spaces

Daniel Morales González (ddmmgg1993@gmail.com)
Universidad de Extremadura

A Banach space X is a twisted Hilbert space if there is a subspace Y isomorphic to a Hilbert space with the quotient X/Y also isomorphic to a Hilbert space. We show some examples of twisted hilbert spaces generated by complex interpolation scales obtained by vector valued amalgamation.

On the dual of variable Lebesgue spaces

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Given an open interval $I \subseteq \mathbb{R}$ and a measurable function $p : I \to [1, +\infty)$, the variable Lebesgue space $L^{p(\cdot)}(I)$ is the subspace of measurable functions $f : I \to \mathbb{R}$ such that the following norm is finite

$$\|f\|_{L^{p(\cdot)}(I)} = \inf \left\{ \lambda > 0 : \int_I \left| \frac{f(x)}{\lambda} \right|^{p(x)} \mathrm{d}x \leq 1 \right\}.$$

The topological dual of this Banach space is perfectly known when $\|p\|_{L^\infty(I)}$

Numerical index with respect to an operator

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The concept of numerical index was introduced by G. Lumer in 1968 in the context of the study and the classification of operator algebras. This is a constant of a Banach space relating the behaviour of the numerical range with that of the usual norm on the Banach algebra of all bounded linear operators on the space. Recently, Ardalani introduced new concepts of numerical range and numerical radius of one operator with respect to another one, which generalize in a natural way the classical concepts of numerical range and numerical radius. Therefore, it is possible to define a concept of numerical index with respect to an operator which relates the numerical radius with respect to the operators with the operator norm. The main objective is to study basic properties of this new numerical index, present some examples and provide results on the stability with respect some natural operations and results on the set $\mathcal{N}(\mathcal{L}(X,Y))$ of the values of the numerical indices with respect to all norm-one operators on $\mathcal{L}(X,Y)$.

Recent results on super weak compactness

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As the title says, we will review recent results (and not so recent) on super weakly compact sets with the aim of arouse the interest in them among the colleagues.

Some aspects of the lattice structure of $C_0(K, X)$ and $c_0(\Gamma)$

Michael Alexander Rincón Villamizar (mrincon81@gmail.com)
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The talk will have two parts: in the first one, we show that if there exists a Banach lattice isomorphism from $C_0(K, X)$ onto $C_0(S, X)$ with distortion less than the number $\inf\{\max\{\|x+y\|, \|x-y\|\} : \|x\| = \|y\| = 1, x, y > 0\}$, then K and S are homeomorphic. Finally in the second one, we discuss some questions about the Banach-lattice $c_0(\Gamma)$ related with the classical Lozanovskii theorem.

On Banach spaces which are weak* sequentially dense in its bidual

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New results on Banach spaces which are weak* sequentially dense in its bidual will be presented. We will focus on weak* sequential closures of convex bounded sets of dual spaces. Some related open problems will be discussed.

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The free Banach lattice generated by a lattice

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In this talk we introduce the free Banach lattice generated by a lattice and show some of its properties. Roughly speaking, the *free Banach lattice generated by a lattice* $\mathbb{L}$, which we denote by $FBL\langle\mathbb{L}\rangle$, is a Banach lattice which contains a subset lattice-isomorphic to $\mathbb{L}$ in a way that its elements work as free generators modulo the lattice relations on $\mathbb{L}$. We show that this object exists and we give an explicit description of it as a space of functions. Some properties that we study are the *countable chain condition* and the *projectivity*. For example, we show that for $\mathbb{L}$ linearly ordered, $FBL\langle\mathbb{L}\rangle$ has the countable chain condition if and only if $\mathbb{L}$ is order-isomorphic to a subset of the real line. With respect to the projectivity, we show that $FBL\langle\mathbb{L}\rangle$ is projective when the lattice $\mathbb{L}$ is finite and it is not projective when $\mathbb{L}$ is an infinite linearly ordered set.

Banach-Stone type theorems for subspaces of continuous functions

Jakub Rondoš (jakub.rondos@gmail.com)
Charles University Prague

We present joint results with Jiřì Spurnỳ concerning the generalizations of the classical Banach-Stone theorem to the context of closed subspaces of continous functions, whose Choquet boundaries are so called weak peak points. We show that if the Banach-Mazur distance of two such subspaces is strictly less than 2, then the boundaries are homeomorphic. Next we show that the boundaries have the same cardinality if the two subspaces are just isomorphic.

Projections onto spaces of polynomials

Tommaso Russo (russotom@fel.cvut.cz)
Czech Technical University in Prague

We shall study the existence of bounded projections from spaces of Lipschitz functions on a Banach space onto subspaces of homogeneous polynomials. Our aim is to contribute to the study of spaces of Lipschitz functions and is, in particular, related to an open question posed by Gilles Godefroy. Moreover, our results are related to a classical result by Joram Lindenstrauss. This is a joint work with Petr Hàjek.

A z^k-invariant subspace without the wandering property

Daniel Seco (dseco@math.uc3m.es)
U. Carlos III de Madrid

We study operators of multiplication by z^k in Dirichlet-type spaces D_α. We establish the existence of k and α for which some z^k-invariant subspaces of D_α do not satisfy the wandering property. As a consequence of the proof, any Dirichlet-type space accepts an equivalent norm under which the wandering property fails for some space for the operator of multiplication by z^k, for any $k \geq 6$.

A new weak Hilbert space

Jesús Suárez (jesus@unex.es)
Universidad de Extremadura

We give the first nontrivial example of a weak Hilbert space that is a twisted Hilbert space. We will show several of its properties. For example, it solves some problems implicit in the literature.

On minimal and unbounded topologies

Mitchell Taylor (mitchelltaylor@berkeley.edu)
UC Berkeley

In this talk I will discuss the process of "unbounding" a topology on a vector lattice. In the L_p-spaces this process converts the norm topology to the topology of convergence in measure. I will then discuss how unbounded topologies connect with the minimal and universal objects in the category of vector lattices, and how some of their natural properties cannot be characterized in ZFC.

Norm attaining operators of finite rank

Dirk Werner (werner@math.fu-berlin.de)

FU Berlin

We provide sufficient conditions on a Banach space X in order that there exist norm attaining operators of rank at least two from X into any Banach space of dimension at least two. For example, a rather weak such condition is the existence of a non-trivial cone consisting of norm attaining functionals on X. We go on to discuss density of norm attaining operators of finite rank among all operators of finite rank, which holds for instance when there is a dense linear subspace consisting of norm attaining functionals on X. In particular, we consider the case of Hilbert space valued operators where we obtain a complete characterization of these properties.
