AM02

Harmonic Analysis and Operator Theory

Análisis Armónico y Teoría de Operadores

Organizers **Organizadores** **Antolatzaileak**

Luciano Abadías Ullod
(Universidad de Zaragoza)

Marta De León Contreras
(Universidad de La Laguna)

Javier Gonzalez Doña
(Universidad Carlos III de Madrid)

Miguel Monsalve López
(Universidad Complutense de Madrid)

Description **Descripción** **Deskribapena**

The aim of this session is to bring together young researchers who develop their work in Mathematical Analysis, mainly Harmonic Analysis and Operator Theory. We want to place special emphasis on the relationship between the aforementioned areas and stimulate interaction and debate of problems from different points of view.
In particular, recent problems of Harmonic Analysis and Operator Theory will be shown, related to singular integrals, weighted inequalities, geometric measure theory, spectral properties, invariant subspaces, among others. In addition, the relationship of these topics with other areas, such as Complex Analysis and Partial Differential Equations, will be shown.

El objetivo de esta sesión es reunir a jóvenes investigadores que desarrollan su trabajo en Análisis Matemático, siguiendo como líneas principales el Análisis Armónico y la Teoría de Operadores. Se quiere hacer especial hincapié en la relación entre las áreas mencionadas y estimular la interacción y el debate de los problemas desde diferentes puntos de vista.
En particular, se mostrarán problemas recientes del Análisis Armónico y Teoría de Operadores, relacionados con integrales singulares, desigualdades con peso, teoría de la medida geométrica, propiedades espectrales, subespacios invariantes, entre otros. Además se mostrará la relación de estos temas con otras áreas, como el Análisis Complejo y Ecuaciones en Derivadas Parciales.

MSC Codes **Códigos MSC** **MSC Kodeak**

43-XX; 47-XX

(primary)

30-XX; 42-XX; 46-XX

(secondary)

Slots **Bloques** **Blokeak**

1.A (Aula 0.7); 1.B (Aula 0.7); 1.C (Aula 0.7)

QR Code **Código QR** **QR Kodea**

Session Schedule **Horario de la Sesión** **Saioaren Ordutegia**

L13 | 17:30-17:50 | 0.7
A variant of the isoperimetric inequality
Andrea Olivo (BCAM)

L13 | 18:00-18:20 | 0.7
Random Carleson Measures in the Polydisc
Alberto Dayan (Saarland University)

L13 | 18:30-18:50 | 0.7
Boundedness of multilinear operators at the end-points with extrapolation techniques
Laura Sánchez-Pascuala Dones (Universidad Complutense de Madrid)

L13 | 19:00-19:20 | 0.7
Pointwise localization and sharp weighted bounds for Rubio de Francia square functions
Mikel Flórez Amatriain (BCAM)

M14 | 15:00-15:20 | 0.7
Fine spectra of the Cesàro-Hardy operator on $L^p[0,1]$ *and the Invariant Subspace Problem*
Alejandro Mahillo Cazorla (Universidad de Zaragoza)

M14 | 15:30-15:50 | 0.7
Similarity to contraction semigroups on Hilbert spaces
Jesus Oliva-Maza (Universidad de Zaragoza)

M14 | 16:00-16:20 | 0.7
A counterexample for chain recurrence in Linear Dynamics
Antoni López-Martínez (Universitat Politècnica de València)

M14 | 16:30-16:50 | 0.7
Localization of non-trivial solutions for operator systems
Jorge Rodríguez López (Universidade de Santiago de Compostela)

M14 | 17:30-17:50 | 0.7
Volterra operator acting on Bergman spaces of Dirichlet series
Carlos Gómez Cabello (Universidad de Sevilla)

M14 | 18:00-18:20 | 0.7
An optimization problem and point-evaluation in Paley–Wiener spaces
Sarah May Instanes (Norwegian University of Science and Technology)

M14 | 18:30-18:50 | 0.7
Interpolation of weak Orlicz types and strong maximal in von Neumann algebras
Jorge Pérez García (ICMAT)

M14 | 19:00-19:20 | 0.7
Sparse domination of Bergman projectors and boundedness of integral operators on trees
Elena Rizzo (Università di Milano Statale)

Monday 13
17:30-17:50
[Room 0.7]

Lunes 13
17:30-17:50
[Aula 0.7]

Astelehena 13
17:30-17:50
[Gela 0.7]

A variant of the isoperimetric inequality

Andrea Olivo
(BCAM)

It is well known that the celebrated Gagliardo estimate can be viewed as an extension of the classical isoperimetric inequality although the best constant was not obtained by Gagliardo. In this talk, we will explore some generalizations of this result involving weights, and we will discuss how it can be extended beyond smooth domains.

Ongoing joint wotk with Carlos Pérez and Ezequiel Rela.

Monday 13
18:00-18:20
[Room 0.7]

Lunes 13
18:00-18:20
[Aula 0.7]

Astelehena 13
18:00-18:20
[Gela 0.7]

Random Carleson Measures in the Polydisc

Alberto Dayan
(Saarland University)

The celebrated work of Carleson characterizes Carleson measures on the unit disc in terms of the so called one-box condition. In the polydisc, a geometric characterization of Carleson measures is much more elusive. In this talk, we will consider random atomic measures in the polydisc, and we will discuss their probability of being Carleson measures. We will discuss a well known re-formulation of the problem in terms of Gram matrices, and then use tools from the theory of random matrices.

Joint work with Nikolaos Chalmoukis and Giuseppe Lamberti.

arXiv:2402.13645

Monday 13 **Lunes 13** **Astelehena 13**
18:30-18:50 **18:30-18:50** **18:30-18:50**
[Room 0.7] **[Aula 0.7]** **[Gela 0.7]**

Boundedness of multilinear operators at the end-points with extrapolation techniques

Laura Sánchez-Pascuala Dones
(Universidad Complutense de Madrid)

Extrapolation techniques allow us to determine bounds for an operator in different spaces based on known bounds on other spaces. The aim of this talk is to use various multilinear extrapolation techniques that extend existing linear results. The techniques are based on the extrapolation theorems by Yano and Rubio de Francia, which use weights from the Muckenhoupt classes.

Joint work with M.J. Carro and T. Luque.

Monday 13 **Lunes 13** **Astelehena 13**
19:00-19:20 **19:00-19:20** **19:00-19:20**
[Room 0.7] **[Aula 0.7]** **[Gela 0.7]**

Pointwise localization and sharp weighted bounds for Rubio de Francia square functions

Mikel Flórez Amatriain
(BCAM)

The Rubio de Francia square function is the square function formed by frequency projections over a collection of disjoint intervals of the real line. In this talk, we will show a new pointwise sparse bound for the Rubio de Francia square functions. These sparse bounds lead to quantified weighted inequalities. In the first part of the talk, we will give the background of the problem. In the second part, we will explain the new results mentioned above.

Joint work with Francesco Di Plinio, Ioannis Parissis and Luz Roncal.

arXiv:2308.01442

Tuesday 14 | **Martes 14** | **Asteartea 14**
15:00-15:20 | **15:00-15:20** | **15:00-15:20**
[Room 0.7] | **[Aula 0.7]** | **[Gela 0.7]**

Fine spectra of the Cesàro-Hardy operator on $L^p[0,1]$ and the Invariant Subspace Problem

Alejandro Mahillo Cazorla
(Universidad de Zaragoza)

We study the boundedness and spectral properties of a generalized Cesàro-Hardy operator in $L^p[0,1]$. Using semigroup theory, we express these operators and their duals via subordination with composition semigroups. Through functional calculus, we transfer the spectral properties of the semigroups' generators to the generalized Cesàro-Hardy operators. Additionally, we prove the universality of certain translations of the semigroup, providing new insights into the Invariant Subspace Problem.

Joint work with Luciano Abadías.

Tuesday 14 | **Martes 14** | **Asteartea 14**
15:30-15:50 | **15:30-15:50** | **15:30-15:50**
[Room 0.7] | **[Aula 0.7]** | **[Gela 0.7]**

Similarity to contraction semigroups on Hilbert spaces

Jesus Oliva-Maza
(Universidad de Zaragoza)

A semigroup of bounded operators $(T(t))_{t\geq 0}$ on a Hilbert space H is said to be similar to a contraction semigroup if there exists an equivalent Hilbertian norm $\|\cdot\|_e$ on H for which $\|T(t)\|_e \leq 1$, $t \geq 0$. In this talk we present a new characterization of semigroups similar to contraction semigroups in terms of quasi-contraction semigroups. We also provide new counterexamples for this theory, namely a (quasi-)nilpotent semigroup which is not similar to a contraction one.

Joint work with Yuri Tomilov.

Tuesday 14	**Martes 14**	**Asteartea 14**
16:00-16:20	**16:00-16:20**	**16:00-16:20**
[Room 0.7]	**[Aula 0.7]**	**[Gela 0.7]**

A counterexample for chain recurrence in Linear Dynamics

Antoni López-Martínez
(Universitat Politècnica de València)

We exhibit the existence of continuous (and even invertible) linear operators acting on Banach (and even Hilbert) spaces whose restriction to their respective closed linear subspaces of chain recurrent vectors are not chain recurrent operators. This example completely solves in the negative a problem recently posed by N. C. Bernardes Jr. and A. Peris on chain recurrence in Linear Dynamics.

Joint work with Dimitris Papathanasiou.

arXiv:2402.01377

Tuesday 14	**Martes 14**	**Asteartea 14**
16:30-16:50	**16:30-16:50**	**16:30-16:50**
[Room 0.7]	**[Aula 0.7]**	**[Gela 0.7]**

Localization of non-trivial solutions for operator systems

Jorge Rodríguez López
(Universidade de Santiago de Compostela)

We deal with the existence and localization of solutions for operator systems by means of the fixed point index. We emphasize that our results are coexistence fixed point theorems for operator systems, that means that every component of the fixed points obtained is non-trivial. Finally, these coexistence fixed point theorems are applied to obtain results concerning the existence of positive solutions for systems of Hammerstein integral equations.

Tuesday 14	**Martes 14**	**Asteartea 14**
17:30-17:50	**17:30-17:50**	**17:30-17:50**
[Room 0.7]	**[Aula 0.7]**	**[Gela 0.7]**

Volterra operator acting on Bergman spaces of Dirichlet series

Carlos Gómez Cabello
(Universidad de Sevilla)

The Volterra operator T_g, although well understood in the unit disc setting, its study on Banach spaces of Dirichlet series is quite recent. In this talk, we focus on the boundedness of the operator T_g acting on some Bergman-type spaces of Dirichlet series: the $\mathcal{A}^\mu_p$-spaces. To do so, we shall introduce a new family of Bloch spaces of Dirichlet series, the Bloch μ-spaces. Using these spaces we shall provide a sufficient and necessary condition for the operator T_g to act boundedly on the spaces $\mathcal{A}^\mu_p$.

Joint work with Professor Pascal Lefèvre and Professor Hervé Queffélec.

arXiv:2402.12524

Tuesday 14	**Martes 14**	**Asteartea 14**
18:00-18:20	**18:00-18:20**	**18:00-18:20**
[Room 0.7]	**[Aula 0.7]**	**[Gela 0.7]**

An optimization problem and point-evaluation in Paley–Wiener spaces

Sarah May Instanes
(Norwegian University of Science and Technology)

We study the constant $\mathscr{C}_p$ defined as the smallest constant C such that $|f(0)|^p \leq C\|f\|_p^p$ holds for every function f in the Paley–Wiener space PW^p. Brevig, Chirre, Ortega-Cerdà, and Seip have recently shown that $\mathscr{C}_p < p/2$ for all $p > 2$. We improve this bound for $2 < p \leq 5$ by solving an optimization problem.

arXiv:2409.11963

Tuesday 14	**Martes 14**	**Asteartea 14**
18:30-18:50	**18:30-18:50**	**18:30-18:50**
[Room 0.7]	**[Aula 0.7]**	**[Gela 0.7]**

Interpolation of weak Orlicz types and strong maximal in von Neumann algebras

Jorge Pérez García
(ICMAT)

The Marcinkiewicz interpolation theorem states that an operator of weak type (p_0, p_0) and (p_1, p_1) is of strong type (p, p) for all the ps in between p_0 and p_1. It's non-commutative version is true, though the proof much more involved. In a joint work with Adrián González-Pérez and Javier Parcet, we adapt a recently published proof of this result in order to deal with operators of weak Orlicz type. We partially solve an open problem related to convergence of martingales in von Neumann algebras.

Joint work with Adrián González-Pérez and Javier Parcet.

arXiv:2404.12061

Tuesday 14	**Martes 14**	**Asteartea 14**
19:00-19:20	**19:00-19:20**	**19:00-19:20**
[Room 0.7]	**[Aula 0.7]**	**[Gela 0.7]**

Sparse domination of Bergman projectors and boundedness of integral operators on trees

Elena Rizzo
(Università di Milano Statale)

We consider harmonic Bergman spaces on radial trees and compute some onb and kernels. Assuming the tree to have bounded geometry we get sparse domination for the Bergman projector P, that implies boundedness results and provides weighted estimates for P. Allowing the tree to have unbounded geometry we deal with a nondoubling setting and prove a sparse domination-like result for P. Through a suitable dyadic system and a CZ decomposition, we get boundedness properties for integral operators

Joint work with J. Conde Alonso, F. De Mari, M. Monti and M. Vallarino.