

# II Jornada IMAC en espacios de Banach

22 DE JULIO DE 2022

INSTITUT UNIVERSITARI DE MATEMÀTIQUES I APLICACIONS  
UNIVERSITAT JAUME I DE CATELLÓ

## ABSTRACTS

**Andrés Quilis**

(Universitat Politècnica de València)

*Constructing a complete metric space without non-singleton separable Lipschitz retracts*

In this talk we construct a complete metric space whose only separable Lipschitz retracts are singleton subsets. We compare this construction with analogous results in the linear case of Banach spaces, and we relate it with the structure of linearly complemented subspaces of Lipschitz-free spaces, which has been an active area of research in the past two decades. This is a joint work with P. Hájek, and has been partially supported by PAID-01-19.

**Óscar Roldán**

(Universitat de València)

*On Banach spaces of Lipschitz functionals that attain their norms strongly*

We study the existence of non-trivial Banach subspaces  $Y$  of  $\text{Lip}_0(M)$  consisting of strongly norm-attaining Lipschitz functionals, where  $M$  is a pointed metric space (that is, with a distinguished point  $0$ ), and  $\text{Lip}_0(M)$  is the space of Lipschitz functionals  $f$  on  $M$  satisfying that  $f(0) = 0$ . We characterize when such subspaces can have dimension  $n$ , for  $n \in \mathbb{N}$ , and show that infinite-dimensional such subspaces can also exist in many cases. We also study the possible sizes of the metric space  $M$  given that such a subspace  $Y$  exists. Finally, we study some related questions for some particular classes of metric spaces.

This talk is based on a joint work with Vladimir Kadets (see [1]). The author receives economical support from the Spanish Ministerio de Universidades, grant FPU17/02023, and the research project MTM2017-83262-C2-1-P/MCIN/AEI/10.13039/501100011033 (FEDER).

## Referencias

- [1] Vladimir Kadets and Óscar Roldán, *Closed linear spaces consisting of strongly norm attaining Lipschitz mappings*, preprint. Available at <https://arxiv.org/abs/2202.06855>.

**Javier Falcó**

(Universitat de València)

*Recent results in group invariant mappings*

In this talk, we will give a short introduction to the theory of group invariant mappings, with special focus on the geometry of Banach spaces. The most basic examples of group invariant functionals are functionals defined on  $\mathbb{R}^2$  that are invariant under the permutation of the coordinates, that is,  $f(x, y) = f(y, x)$  for all  $x, y \in \mathbb{R}$ . Our aim in this talk is to present some natural examples of group invariant mappings on Banach spaces (functionals, operators and multilinear mappings) and study some of the techniques used when working in this scenario. Finally, we will review some classical results in functional analysis and examine whether their analog holds in the group invariant setting.

**Rubén Medina**

(Czech Technical University and Universidad de Granada)

*On holomorphic functions attaining their weighted norm*

In this talk we will focus on holomorphic functions between Banach spaces attaining their weighted norm. Given a holomorphic function  $f$ , we will say that  $f$  attains its weighted norm whenever there is an element  $x$  in the domain space  $X$  such that

$$(1 - \|x\|^2)\|f(x)\| = \sup_{y \in B_X} (1 - \|y\|^2)\|f(y)\|.$$

We will go through all the new developments, considering the problem for homogeneous polynomials as well as for non-homogeneous ones. We will see the differences between this topic and the classic study of holomorphic functions attaining their supremum. In fact, we prove that the Bishop-Phelps theorem does not hold in this setting. All the results of the talk have been developed in collaboration with Sheldon Dantas in [1].

## Referencias

- [1] Sheldon Dantas and Rubén Medina, *On holomorphic functions attaining their weighted norm*, preprint. Available at <https://arxiv.org/abs/2206.11206>.

## HORARIO

Time	Speaker	Title of the talk
10.00 - 10.45	<b>Andrés Quilis</b> (Universitat Politècnica de València)	<i>Constructing a complete metric space without non-singleton separable Lipschitz retracts</i>
10.55 - 11.40	<b>Óscar Roldán</b> (Universitat de València)	<i>On Banach spaces of Lipschitz functionals that attain their norms strongly</i>
11.45 - 12.20	Coffee break	
12.20 - 13.05	<b>Javier Falcó</b> (Universitat de València)	<i>Recent results in group invariant mappings</i>
13.15 - 14.00	<b>Rubén Medina</b> (ČVUT and Universidad de Granada)	<i>On holomorphic functions attaining their weighted norm</i>
14.00	Lunch	