

Departamento de Análisis Matemático

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Conferencia

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“On certain preservers of λ -Aluthge
transforms”

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Departamento de Análisis Matemático

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ON CERTAIN PRESERVERS OF λ -ALUTHGE TRANSFORMS

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In this talk, we study the bijections commuting with the λ -Aluthge on more natural C^* -products and C^* -Jordan products. Let M and N be arbitrary von Neumann algebras. For any a in M or in N , let $\Delta_\lambda(a)$ denote the λ -Aluthge transform of a . Suppose that M has no abelian direct summand. We prove that every bijective map $\Phi : M \rightarrow N$ satisfying

$$\Phi(\Delta_\lambda(a \circ b^*)) = \Delta_\lambda(\Phi(a) \circ \Phi(b)^*), \text{ for all } a, b \in M,$$

(for a fixed $\lambda \in [0, 1]$), maps the hermitian part of M onto the hermitian part of N (i.e. $\Phi(M_{sa}) = N_{sa}$) and its restriction $\Phi|_{M_{sa}} : M_{sa} \rightarrow N_{sa}$ is a Jordan isomorphism. If we also assume that $\Phi(x + iy) = \Phi(x) + \Phi(iy)$ for all $x, y \in M_{sa}$, then there exists a central projection p_c in M such that $\Phi|_{p_c M}$ is a complex linear Jordan $*$ -isomorphism and $\Phi|_{(1-p_c)M}$ is a conjugate linear Jordan $*$ -isomorphism.

Given two complex Hilbert spaces H and K with $\dim(H) \geq 2$, we also establish that every bijection $\Phi : \mathcal{B}(H) \rightarrow \mathcal{B}(K)$ satisfying

$$\Phi(\Delta_\lambda(ab^*)) = \Delta_\lambda(\Phi(a)\Phi(b)^*), \text{ for all } a, b \in \mathcal{B}(H),$$

must be a complex linear or a conjugate linear $*$ -isomorphism.

This is a joint work with Prof. Antonio M. Peralta, Universidad de Granada, Spain.

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- [2] F. Chabbabi, Product commuting maps with the λ -Aluthge transform, *J. Math. Anal. Appl.* **449** (1), 589-600 (2017).
- [3] F. Chabbabi, M. Mbekhta, General Product Nonlinear Maps Commuting with the λ -Aluthge Transform, *Mediterr. J. Math.*, **14**: 42 (2017). <https://doi.org/10.1007/s00009-017-0860-7>
- [4] F. Chabbabi, M. Mbekhta, Jordan product maps commuting with the λ -Aluthge transform, *J. Math. Anal. Appl.* **450** (1), 293-313 (2017).