Can one determine the structure of a von Neumann algebra by the λ-Aluthge transform?

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September, 2018

Abstract

Let a be an element in a von Neumann algebra M. Let $a = u|a|$ be the polar decomposition of a in M, where u is a partial isometry in M, $|a| = (a^*a)^{\frac{1}{2}}$, and u^*u is the range projection of $|a|$. Given $\lambda \in [0,1]$, the *λ-Aluthge transform* of a is defined by $\Delta_\lambda(a) = |a|^\lambda u |a|^{1-\lambda}$. We shall present in this talk some recent results in the line of preservers by studing the structure of those bijective maps between von Neumann algebras commuting with the λ-Aluthge transform on products of the form ab, $ab*$, $a \circ b$ and $a \circ b^*$, where $\circ$ denotes the natural Jordan product. We shall show that these mappings are naturally related to the Jordan structure of the von Neumann algebras. We shall also see how these new results are connected with the classical studies by J. Hakeda and K. Saitô on linear bijections between von Neumann algebras preserving products of the form ab and $a \circ b$.

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