

On non-commutative L_p spaces

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Abstract

Classical L_p spaces, which form the foundation of modern analysis, play a central role in harmonic analysis, probability theory, and partial differential equations (PDEs). In recent decades, their non-commutative analogues arising from operator algebras have gained increasing prominence due to their applications in quantum probability, non-commutative geometry, and quantum information theory. This talk will provide an accessible introduction to non-commutative L_p spaces associated with a semi-finite von Neumann algebra \mathcal{M} . We will explore notable examples of von Neumann algebras and explain how these non-commutative L_p spaces generalize classical L_p spaces when \mathcal{M} is non-abelian. Furthermore, we will discuss how familiar concepts such as norms, duality, and Hölder's inequality extend to this broader setting.