

The Radon-Nikodým Theorem for vector measures and factorization of operators on Banach function spaces

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In the theory of Banach function spaces, the classical Radon-Nikodým theorem provides a fundamental tool for representing functionals of the dual space as integrals of concrete measurable functions. In the vector valued case, vector valued versions of this result has also been a classical technique for providing integral representations of operators, and leads to the rich (geometric and topological) theory of Banach spaces with the Radon-Nikodým property. In this talk we consider a slightly different approach to the problem of integral representations. Consider a couple of Banach space valued vector measures $m, n : \Sigma \rightarrow X$. In which cases it can be said that n can be written as an integral of m ? In other words, when there is a (scalar) m -integrable function f such that for every measurable set $A \in \Sigma$,

$$n(A) := \int_A f dm.$$

The answer is given by several Radon-Nikodým type theorems for couples of vector measures, that will be explained in this talk. These results give interesting integral representations of operators, that provide a powerful point of view for obtaining factorization of operators through Banach function spaces with applications in general Functional Analysis and Harmonic Analysis.

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