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K. Musiał

Institute of Mathematics, Wrocław University, 50-384 Wrocław, Poland
kazimierz.musial@math.uni.wroc.pl

Multimeasures with Values in Conjugate Banach Spaces and the Weak Radon-Nikodým Property

I prove that for a Banach space X the conjugate space X^* has the WRNP if and only if for every complete probability space (Ω, Σ, μ) , every μ -continuous multimeasure of σ -finite variation that takes as its values closed (closed bounded, weak*-compact) and convex subsets of X^* can be represented as a Pettis integral of a multifunction with closed bounded (closed bounded, weak* compact) and convex values. This generalizes the known characterization of conjugate Banach spaces with the weak Radon-Nikodým property via functions (cf. the author, *The weak Radon-Nikodým property of Banach spaces*, *Studia Math.* 64 (1979) 151–174, or *Pettis integral*, in: *Handbook of Measure Theory I*, Elsevier, Amsterdam (2002) 532–586). The main tool is a lifting of a multifunction, that is Effros measurable with respect to the weak* open subsets of X^* .

Keywords: Multimeasures, multifunctions, weak Radon-Nikodým property, Pettis integral, lifting.

MSC: 28B20; 28B05, 46G10, 54C60.