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The general Fubini theorem in complete bornological locally convex spaces. (English)

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This paper is a continuation of the authors' paper ["The Fubini theorem for bornological product measures", Results Math. 54, No. 1–2, 65–73 (2009; Zbl 1184.46043)]. Here, X, Y, Z are Hausdorff complete bornological locally convex spaces with filtering upwards bases of bornologies $\mathcal{U}, \mathcal{W}, \mathcal{V}$, respectively; here, each $U \in \mathcal{U}$ is a closed, absolutely convex bounded subset of X and $U \supset U_0$ a fixed closed, absolutely convex bounded subset of X. The subspace of X generated by U, with Minkowski functional of U, is a Banach space X_U. The topology of X is the inductive limit topology of the Banach spaces $\{X_U : U \in \mathcal{U}\}$. Similar properties hold for the topologies of Y, Z arising from $\mathcal{W}, \mathcal{V}$ respectively. $L(X, Y)$ is the space of all continuous linear functions from X to Y; similarly for $L(Y, Z)$ and $L(X, Z)$.
T, S are two sets, $\triangle$ and $\bigtriangledown$ are δ-rings on T and S, respectively, and $m : \triangle \to L(X, Y)$ and $n : \bigtriangledown \to L(Y, Z)$ are two measures. With the help of $(U, W, V) \in (\mathcal{U}, \mathcal{W}, \mathcal{V})$, the authors reduce the study from complete bornological locally convex spaces X, Y, Z to the Banach spaces X_U, Y_W, Z_V,. Under certain conditions, an existence theorem for the product measure $m \otimes n : \triangle \otimes \bigtriangledown \to L(X, Z)$ is proved. Then under certain conditions, a Fubini type theorem is proved for this product measure.

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Classification :
∗46G10 Vector-valued measures and integration
28B05 Vector-valued set functions etc. (measure theory)