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John D. Williams* (williams@math.uni-sb.de), Universität des Saarlandes, Fachrichtung Mathematik, Postfach 151150, 66041 Saarbrücken, Germany. *B-valued Free Convolution for Unbounded Operators.*

Consider the \mathcal{B} -valued probability space $(\mathcal{A}, E, \mathcal{B})$, where \mathcal{A} is a tracial von Neumann algebra. In this talk, we will present recent results that extend the theory of operator valued free probability to the algebra of affiliated operators $\tilde{\mathcal{A}}$. For a random variable $X \in \tilde{\mathcal{A}}^{sa}$ we study the Cauchy transform G_X and show that the operator algebra $(\mathcal{B} \cup \{X\})''$ can be recovered from this function. In the case where \mathcal{B} is finite dimensional, we show that, when $X, Y \in \tilde{\mathcal{A}}^{sa}$ are assumed to be \mathcal{B} -free, the \mathcal{R} -transforms are defined on universal subsets of the resolvent and satisfy

$$\mathcal{R}_X + \mathcal{R}_Y = \mathcal{R}_{X+Y}.$$

Examples indicating a failure of the theory for infinite dimensional \mathcal{B} are provided. Lastly, we show that the class of functions that arise as the Cauchy transform of affiliated operators is, in a natural way, the closure of the set of Cauchy transforms of bounded operators. Time permitting, we will utilize these results to provide new examples of non-commutative convolution operations. (Received September 21, 2015)