

1077-46-1791

**Mihai Popa\*** (popa@mast.queensu.ca), Department of Mathematics and Statistics, Queen's University, Jeffery Hall 209, University Avenue, Kingston, Ontario K7L 3N6, Canada. *Some Applications of Non-Commutative Functions in Free Analysis.*

Given two vector spaces,  $V$  and  $W$  over the complex numbers, a non-commutative function is, briefly, a mapping from a certain class of subsets of the matrix space over  $V$  to the matrix space over  $W$  satisfying some compatibility conditions: it has to respect direct sums and simultaneous similarities, or equivalently, simultaneous intertwinings. Noncommutative functions have very strong regularity properties and they admit a very nice differential calculus, closely related to some QD-bialgebras arising in free probabilities. Such objects were considered before by J. L. Taylor in his groundbreaking work on the noncommutative spectral theory, and more recently independently by D.-V. Voiculescu in free probability. Besides a brief introduction in the theory of non-commutative functions, the lecture will survey some applications of this theory in operator-valued non-commutative probability, such as non-commutative free Levy-Hincine formulas, Bercovici-Pata bijection, op-valued Cauchy and R-transforms, op-valued semicircle, arcsine and Bernoulli laws. Most of the results presented are joint work with V. Vinnikov and S. Belinschi. (Received September 21, 2011)