

On a quantum Bernstein Theorem.

PAWEŁ JÓZIAK

Warsaw University of Technology

P.Joziak@mini.pw.edu.pl

18 WORKSHOP, BĘDLEWO 2018

Abstract

The classical Theorem of Bernstein states that a random vector consisting of independent entries with the property that its entries are still independent after applying a generic rotation, is necessarily a Gaussian vector. A similar type of result was obtained by Nica, where independent was replaced with free, and Gauss law was replaced with Wigner law. We pursue a similar type of question with rotation replaced with quantum rotation. Staying in the framework of operator-valued free probability, we show that a random vector with free entries having the property that its entries remain free after applying a quantum family of rotations (described by a quotient of $\mathcal{O}(O_d^+)$) is necessarily a semicircular family of random variables, provided that this quantum family of rotations is not a subset of quantum hyperoctahedral group (the aforementioned quotient of $\mathcal{O}(O_d^+)$ does not factor through $\mathcal{O}(H_d^+)$). We also show that the result is optimal, in the sense that there exist non-semicircular free random variables that remain free after applying the rotations from H_d^+ . Joint work with Kamil Szpojankowski.