

Abstract

The talk is based on the content of the papers J. Math. Phys. 56, 122102 (2015) and Eur. Phys. J. Spec. Top. (2017). The work is devoted to the construction and analysis of the Wigner functions for noncommutative quantum mechanics (NCQM), their marginal distributions, and star-products, following a technique developed earlier, viz, using the unitary irreducible representations of the group G_{NC} , which is the three fold central extension of the Abelian group of R^4 . These representations have been exhaustively studied in earlier papers. The group G_{NC} is identified with the kinematical symmetry group of NCQM of a system with two degrees of freedom.

In this talk, we will also discuss the construction of Wigner functions of NCQM for a system of 2-degrees of freedom using 2-parameter families of gauge equivalence classes of unitary irreducible representations (UIRs) of the Lie group G_{NC} . This general construction of Wigner functions for NCQM, in turn, yields the special cases of Landau and symmetric gauges of NCQM.