Two dimensional plane, modified symplectic structure and quantization

ABSTRACT

Noncommutative quantum mechanics on the plane has been widely studied in the literature. Here, we consider the problem using Isham's canonical group quantization scheme for which the primary object is the symmetry group that underlies the phase space. The noncommutativity of the configuration space coordinates requires us to introduce the noncommutative term in the symplectic structure of the system. This modified symplectic structure will modify the group acting on the configuration space from abelian R^2 to a nonabelian one. As a result, the canonical group obtained is a deformed Heisenberg group and the canonical commutation relation (CCR) corresponds to what is usually found in noncommutative quantum mechanics.

Keyword: Noncommutative quantum mechanics; Canonical group quantization; Symplectic structure