

Deformation quantization of contact manifolds

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The scientific community knows a number of methods for quantizing various systems. So, depending on the input data and frame of the problem, you can choose the most suitable one. Deformation quantization in this case is a convenient tool when we are talking about a smooth manifold with a given dynamic structure. Such structures arise naturally if we consider the Hamiltonian formulation of the classical theory, where the concept of the Poisson bracket is introduced. The application of deformation quantization was first applied by Fedosov to symplectic manifolds, which are analogues of dynamical systems with only the second-class constraints. The most breakthrough work in the area under discussion was Kontsevich's work on deformation quantization of Poisson manifolds, where an elegant geometric approach to solving this problem was presented.

Further extension of the construction to presymplectic manifolds showed that the sequential construction raises cohomological obstruction, the overcoming of which is a difficult and complex task. While in the simplest case of presymplectic manifolds, where there is only one first-class connection, the obstruction have a good physical interpretation. These obstruction can be understood as classes of physical observables that cannot be raised to the quantum level. The geometric interpretation of these invariants is illustrated in this work.

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