Probability as a basic notion of physical system states, quantum and classical

Vladimir I. Man'ko

P.N. Lebedev Physical Institute
Moscow, Russian Federation

manko@sci.lebedev.ru

Abstract

A discussion of the possibility to construct a hybrid mechanics which describes the behavior of systems containing both classical and quantum subsystems is presented. The model is based on the tomographic-probability representation of quantum mechanics and classical mechanics for which the basic equations (Liouville and von Neumann equations) are written in the form of kinetic equations determining the probability distributions which describe the physical system states. A particular case of optical tomographic-probability distributions is discussed, and new experimental results for checking some quantum inequalities are shown. The hybrid mechanics and its specific properties are formulated in the form suitable for checking in homodyne-detection experiments and in the experiments with Josephson-junction version (quantum circuits) of nonstationary Casimir effect given in the tomographic-probability representation.