Even before quantum mechanics took the presently known form of a fundamental theory, its relations to the classical description of the physical reality in terms of classical mechanics were concerns of its founders. Niels Bohr's principle of correspondence determined conditions under which the classical description (the classical limit) should become adequate and correct. Such a formulation must be supplemented by a strict definition what is, actually, the mentioned "classical limit". Quantum and classical descriptions use radically different theoretical and formal concepts to describe the reality. As a consequence, some phenomena present on the classical level are absent on the quantum one and *vice versa*. Thus, for example, the concept of integrability and its manifestations in the form of a regular motion, as well as its opposite - chaos, are purely classical phenomena, hard to define (and observe) in quantum mechanical systems. On the other hand, purely quantum correlations (e.g. entanglement) are quantum phenomena vanishing on the classical level. It is thus natural to ask, how such phenomena and their quantitative characterizations appear and disappear during a limiting transition from quantum to classical level according to the correspondence principle. These problems will be solved by the planned investigations. The results will be of importance primarily for our deeper understanding of relations between quantum and classical physics, but also more practical applications, e.g. when we would like to switch to classical description (in principle, always applicable) of a concrete quantum system to a classical one, often far easier to obtain and interpret than the quantum counterpart. Moreover, understanding the behavior of quantum correlations, which are the main resource for various applications in quantum information technologies aiming at more effective transmission and transformation of information, is of a paramount interest. What is important is how increasing the number of subsystems influences quantum correlations. Such a gradual increase is natural when we intensify our information theoretical tasks, just like in the case of classical computers, when we need more and more elementary logical gates and storage space to perform more complicated calculations.