

Classical limit from within quantum mechanics under coarse-grained measurements

In quantum mechanics the wavepackets initially prepared with minimal position uncertainty can smear over macroscopic distances at later times and initial quantum states can develop into "Schrödinger cat-like"

superpositions of macroscopically distinct states. All these indicate that the very concept of a "trajectory" cease to exist in general in quantum physics. Moreover, as characterized by violation of the Leggett-Garg inequalities quantum mechanics violates the concept of "macrorealism" according to which properties of macroscopic systems exist independent of and are not influenced by measurements. Does this mean that the classical world is substantially different from the quantum world? When and how do physical systems stop to behave quantumly and begin to behave classically? How the concept of "trajectory" emerges in the classical limit? These will be the central questions we will address in the project.

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