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Monitoring the State of a Single Quantum System

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Abstract content
 (Max 300 words)

Continuous weak measurement provide a convenient way to gather information about a quantum system without the need to prepare huge ensembles of identical systems, as required by standard quantum measurement theory. Even though weak measurement alter the dynamics of the wave function slightly, they nevertheless are a good tool to monitor the dynamics of the wave function in real time, in the presence of certain perturbations, for example, sudden momentum kicks due to collisions with particles of a surrounding gas. The continuous monitoring can be employed to influence the dynamics by means of feedback. We focus on the numeric simulation of the continuous monitoring of the position of a massive free particle as well as a particle bound in the following one-dimensional potentials: harmonic and double well. The monitoring scheme involves estimating the wave function of the atom initially and then applying the results of the weak measurement its position to update the estimate through a numerically simulated stochastic evolution.

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