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Quantum Langevin equation for finite-time interactions

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In this talk, we consider the quantum Langevin equation for the Caldeira-Leggett model with an arbitrary time-dependent coupling constant. We solve this equation exactly by employing a train of Dirac-delta switchings. This method also enables us to visualize the memory effect in the environment. Furthermore, we compute the two-time correlation functions of the system's quadratures and show that the discrete-time Fourier transform is well-suited for defining spectral densities, as the Dirac-delta switchings turn continuous functions into discretized samples. Lastly, We demonstrate the applicability of this method in a relativistic framework.

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