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Gaussian non-Markovian unravelings of open quantum system dynamics

We derive a family of Gaussian non-Markovian stochastic Schrödinger equations for the dynamics of open quantum systems.

The different unravelings correspond to different choices of squeezed coherent states, reflecting different measurement schemes on the environment.

Consequently, we are able to give a single shot measurement interpretation for the stochastic states and microscopic expressions for the noise correlations of the Gaussian process.

By construction, the reduced dynamics of the open system does not depend on the squeezing parameters.

They determine the non-Hermitian Gaussian correlation, a wide range of which are compatible with the Markov limit.

We demonstrate the versatility of our results for quantum information tasks in the non-Markovian regime. In particular, by optimizing the squeezing parameters, we can tailor unravelings for improving entanglement bounds or for environment-assisted entanglement protection.

Lastly, I will discuss issues related to time continuous measurement interpretation of Gaussian non-Markovian trajectories.