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Real time simulations of scalar fields with kernelled complex Langevin equation

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Real time evolution of a scalar field theory is investigated. The severe sign problem is circumvented using the Complex Langevin equation. The naive application of the method breaks down for extended real times due to the appearance of boundary terms. We use the kernel freedom of the complex Langevin equation to push the breakdown to larger real-times. We search for the optimal kernel using machine learning methods. Thus, we extend the available range for 1+1d scalar simulations beyond the state of the art simulations.

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