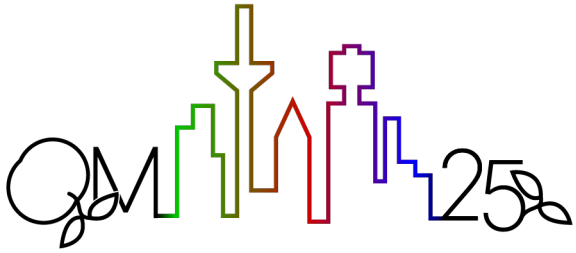

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Real time simulation of scalar field theory towards thermalization

In this work, we study the real-time dynamics of scalar field theory towards thermalization at finite temperature. We first evaluate thermal expectations for observables such as energy density and pressure at finite temperature to extract the property of the system at thermal equilibrium. Specifically, we formulate the scalar fields with both free and ϕ^4 interaction components and compare the harmonic oscillator and field operator bases on qubits. Using initial conditions at different energies, we study non-equilibrium effects of the thermal system in 1+1 dimensions towards equilibrium for various observables, and study their dependences on the system size, number of qubits, choices of bases, as well as initial configurations. In particular, we present our numerical computations using quantum simulator and compared them with exact diagonalization and available analytical calculations.

Category

Theory

Collaboration (if applicable)

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