

The applications of quantum computing techniques to lattice gauge theory and quantum noise mitigation

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Due to the existence of sign problem in the Lattice QCD simulation with finite chemical potential, the traditional Monte-Carlo simulations on classical supercomputers are confronted with significant difficulties on achieving high precision. On the other hand, with the fast development of quantum computers, it might be possible to provide the ultimate solution to sign problem in the future. However, constrained by the nature of NISQ quantum hardware in the current days, quantum noise is one of the main barriers which prevent the realistic applications of quantum computers. Here I will introduce an optimization algorithm, which is run on current quantum devices and has been applied to a 1+1 dimension lattice gauge theory. I will also talk about a method to mitigate the quantum noise in an efficient way, which has been tested on IBM-Q quantum hardwares.

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